

The Iron Age

A Review of the Hardware and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 10 Warren Street, New York.

Vol. XI: No. 25.

New York, Thursday, June 19, 1873.

Four Dollars a Year.
Single Copies, Ten Cents.

Lindelof's Steam Road Roller and Traction Engine.

We illustrate this week the steam road roller and traction engine, patented by Anders Lindelof, of Brooklyn, on Feb. 11th, 1873.

The sizes of these machines are to be from six tons up to any desired weight. The roller proper is made with flanged heads, the same as a boiler head. Ribs are then fitted to the shaft, and bolted firmly and strongly together. The gearing is of cast steel, made in segments, and bolted to the head. In machines weighing 10

feet resulting from space between the sections hitherto experienced, may be entirely obviated. When pressing with sectional rollers having spaces between the sections, the earth will be pressed down under the sections and forced up into the spaces. When the ridges thus formed are subsequently rolled down, the earth rises in other places, and so on, the work being more or less imperfect, according to the nature of the material acted upon.

During the period of the horse epidemic in Washington, this machine was used as a traction engine in hauling gravel from the wharf

draulic crane with a gib about 20 ft. long; the ram is 9 in. diameter with a lift of 6 ft. 6 in., the maximum load being two tons. The pits, lifts, dried ladles, and git molds, are all within the radius of the crane, as they are also of a machine for weighing off the ingots, and in front of the crane are fixed the valves for working it and the lifts. The accumulator and pumps are self-acting, the engines having quadruple pumps and two cylinders. The pressure and waste mains are of equal strength, and are provided with stop valves for reversing the currents, so that in case of a rupture in the pres-

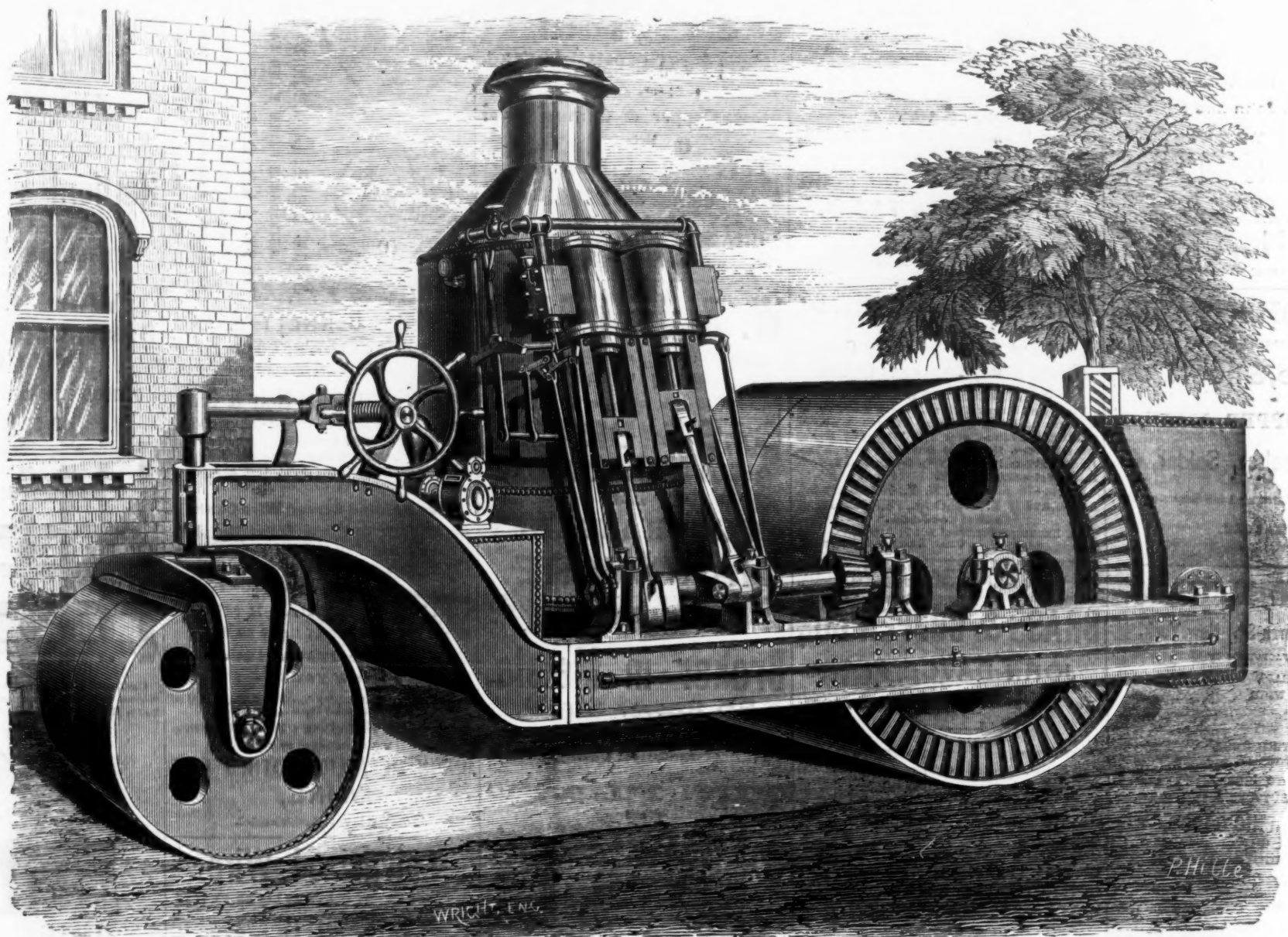
and described the same in a paper. This machine is intended for two purposes. Firstly, to cool the slag as it flows out of the furnace and to disintegrate it, in order to produce a material fit for making concrete buildings. Secondly, for doing away with what are known to blast furnace proprietors and engineers as slag balls, the necessity of which has been impressed upon the public so often by the enormous heaps of slag lying in the neighborhood of iron districts; and also to get rid of the enormous cost of keeping in repair the slag bogies or trucks and the slag boxes. Mr. Wood has had this

good manure for heavy lands, not only the chemical but the mechanical properties of the slag sand has a tendency to keep the land open.

Mining and Metallurgy in Russia.

The following official statistics come to us from St. Petersburg, under date of May 15th, 1873:

According to the latest report published by the government, there were in active operation within the Empire the following mining establishments: Gold, mostly in Siberia, 1126;



LINDELOF'S STEAM ROAD ROLLER AND TRACTION ENGINE.

tons it is intended to use two steam cylinders. For the lighter ones, only one cylinder will be used, preserving the same proportion of gearing. The boiler is of the vertical type. The entire structure of this machine is of wrought iron, so designed and proportioned as to give weight of material. When the machine weighs over 15 tons, cast iron may be used for the main roller, but the cast steel gearing is used as in machines of less size. In light machines it is impossible to get sufficient strength of metal by the use of cast iron. For concrete pavements, 15 tons is too heavy. The effect of rolling and re-rolling, to work down the ridges caused by sectional rollers, is, that the water of the earth is squeezed out upon the surface, forming, with the soil, a putty-like mass. Wrought iron gives a larger surface for the roller than can be easily obtained with cast iron, and in yielding soils, the cast iron rollers, being too heavy in proportion to their surface, sink into the earth, necessitating the use of hydraulic jacks to get them up.

One of the prominent advantages claimed for this roller, is its power of adapting itself to uneven surfaces, without any strain on the frame work. This capability of adjustment is secured through a universal joint at the front of the machine, in which the vertical pivot, corresponding to the king-bolt in carriages, allows the axle to turn radially, the axle allowing the machine to adjust itself to uneven surfaces longitudinally, and a horizontal pivot enabling the front axle to assume a position at any required angle with the rear axle, thus obviating all twisting strains hitherto met with in the construction and use of this class of machines. The result of this construction is, that the roller may now be made in one piece, instead of being divided into sections as heretofore, and the dif-

into the heart of the city, a distance of about two miles, making as many trips a day as a pair of horses could over rough streets. It hauled 10 to 20 horse loads each trip. Ten of the common trucks were put in a train, and it easily drew them, loaded, up the grades.

The inventor claims for this roller, also, special adaptability to new macadamized roads and to concrete pavement, as well as for the purposes of repairing old roads. In the city of Indianapolis one of these rollers of 15 tons weight is now working on pavement work.

The inventor's address is Anders Lindelof, in the care of the Scrimshaw Pavement Company, 16 Court street, Brooklyn, N. Y.

The Iron and Steel Institute.

The following are abstracts of papers read before the British Iron and Steel Institute at its last meeting; which have not appeared in our previous issues:

OPEN HEARTH CASTING PIT.

This paper, read by Mr. B. D. Healey, of Swansea, was intended to explain the mode of casting steel ingots, as carried on at the Elba Steel Works, near Swansea, where two pits have been constructed from designs supplied by Mr. Healey himself, embracing also the system of casting ingots in groups—an invention of Mr. Pink, of the Hoerde Steel Works, Westphalia. The furnaces, the writer states, are built in line with each other in the usual way, with a tapping pit in front of each, but instead of the ordinary pits for the ingot molds, there is a hydraulic lift for the ladle carriage, and a turntable for the ingot molds, the turntable being immediately in front of the lift, and providing the means for casting ingots of various lengths. To a pair of pits there is one hy-

sure main, the works need not be stopped, but the pipe can be replaced, and this main kept in reserve for a similar accident to the other. The lifts are of simple construction; they have 12 in. rams and a lift of 8 ft., and when at the floor level they form a continuous siding for the ladle skulls and pit slags. Underneath each lift small compartments are built to provide for spills occasioned by defective stoppers or fractured molds. The ingot tables are provided with guard plates, which prevent obstructions getting upon the pathway plates, each table being driven by an independent bevel gearing. The ingot molds are placed in groups on the turntables. The ladle receives the metal, and is then moved to the lift and raised to the necessary height to clear the git molds, the turntable being moved at the same time so as to bring the first git mold under the nozzle of the ladle. The molds are usually stopped before the casting commences, the stoppers being put on to suit the weight of ingots required. One or more may be stoppered at the bottom when there is not sufficient metal for the full group, and ingots of different lengths may be cast in the same group. Gas is used for drying the ladles, git molds, and mold bottoms, and the molds are heated by gas when required, the latter arrangement being used also for keeping the bottom plates hot. The men find a marked difference in the temperature of the shop, and say the work is very much lighter than in the old form of pits, beside which there is a saving in the labor required. Mr. Healey concluded by saying that he would be glad to show the plant at work.

THE UTILIZATION OF BLAST FURNACE SLAG.—Mr. Charles Wood, of the Tees Iron Works, Middlesbrough, exhibited a model of his slag cooling machine (see *The Iron Age* of May 1),

machine at work now for several months, and has produced some 7000 or 8000 tons of this material, all of which has been employed in very important works for concrete, for drainage, for building concrete houses, and for top dressing for roads over which there is not a very heavy traffic. Mr. Wood showed several specimens of concrete and slag made from this material. Mr. Wood also exhibited a machine for a second process called by him the "slag sanding machine," by which the whole of the output of slag runs into a bath of water. This water, by the construction of the machine, is kept in a violent state of agitation, and as the liquid slag flows in, it is caught by the agitated water, and distributed in minute particles. The water is kept in agitation by a kind of churn in boxes or screens on the inside, which separates the granulated slag from the water; when carrying it up to the top it drops in a spout, from whence it passes in to the railway trucks. It will at once be seen that by this process the slag is put into a shape by which it may be made use of for many purposes, and it also saves the cost of wear and tear of the iron bogies, the slag boxes, and the annoyance of the liquid slag bursting about the works, which causes so much destruction to life and property. Mr. Woods submitted a box of this slag sand; also, specimens of cement of very great strength made from it, comprised of one part of sand to five of lime. He also exhibited some concrete bricks which are made from the same materials simply by mixing this slag with a small quantity of lime under very heavy pressure, and there can be no doubt that these bricks must replace millions made on the old plan. The chief source of demand however to be looked forward to, is that for manure for the farmers. As the slag contains all the asserted parts of a

platina, 6; silver, 26; copper, 71; iron, 1933; spelter, 6; cobalt, 1, in the Caucasus; tin, 1; arsenic, 2; chromium, 9; coal, 198; rock salt, 4; naphtha and petroleum wells, 772. The smelting works were the following: Two mlts, 2 smelting works for gold, 10 for silver, 39 for copper, 164 furnaces for pig iron, 214 forges and steel works, 4 for spelter, 1 for cobalt and 1 for tin. The number of furnaces at work in the various establishments was 2651, and that of forge hammers, 924. The number of persons employed in the mines and smelting works was 154,197; in the gold mines alone, 68,186; in salines, 40,000; together, 268,383 operatives. Number of steam engines, 492; of water and turbine wheels, 2223, representing a joint horsepower of 56,255.

There is a blast furnace in Catoctin, Maryland, built in 1774, and rebuilt in 1783. This is said to be the oldest blast furnace in the State. In 1717 pig iron was exported from that State to England, the mother country not allowing, at that date, any kind of iron except pig to be made in the colonies, but in 1787 bar iron was permitted to be manufactured, the act providing, however, that there should be no rolling mills built, nor lifting mills, nor forges for making plates, as that would interfere with the manufactures of Great Britain.

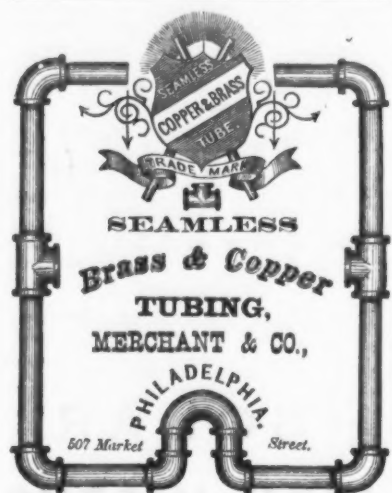
The extensive tube works of Messrs. Freeman & Burgher, at Pittsburgh, were destroyed by fire on Friday evening last. The fire was discovered at a quarter past 9 o'clock. The fire spread to the fitting-shed of the Keystone Bridge Company, which was also destroyed. Messrs. Freeman & Burgher's loss amounts to \$25,000, on which there is an insurance of \$12,000. The Bridge Company's loss is about \$2000 which is fully covered by insurance.

UNION EYELET CO.,

PROVIDENCE, R. I.
MANUFACTURERS OF
EYELETS,
of every description.

B. Long, Suspenders,
A. B. 14, Bustle,
F. D. 1, Skirt,
Extra B. Long, Stationer's,
Tag, A.,
Corset, B. &c., &c.

All orders should be addressed to
Howard, Sanger & Co.,
Selling Agents,
105 & 107 Chambers St., N. Y.



WEST BROADWAY WIRE WORKS,
90 West Broadway, New York.

Brass, Copper and Iron Wire Cloth



HENDRYX & BARTHOLOMEW,
MANUFACTURERS OF
WIRE CLOTH,
BRASS & COPPER WIRE CLOTH,

Locomotive Spark, Hardware Grade, Galvanized
and Tinned Iron Wire Cloth, Green, Drab, Black
and Landscape Wire Window Shade Cloth, Brass
Milk Strainer Cloth.
Special orders will receive prompt attention.
ANSONIA, CONN.

T. C. RICHARDS & CO.,
47 Murray Street, N. Y.,

Manufacturers of Richards' Patent
Porcelain-head Picture Nails; also,
Porcelain Picture, Drawer, Shutter, and
Door Knobs, etc., etc.

Importers of German Brass Goods,
also, China, Gilt, Steel, and Silver
Furniture Nails Wire Nails etc., etc.
We particularly invite the attention
of large buyers to our Patent Picture
Nails and Knobs being a specialty
with us, we offer satisfactory discounts
on good orders.



HOWE, BIGELOW & CO.,
MANUFACTURERS OF
PLAIN AND FANCY WIRE GOODS,
Dish Covers, Corn Poppers, &c.,
179 Main St., Worcester, Mass.
Illustrated Catalogue sent free on application.

Fire Brick.

B. KREISCHER & SON,
New York Fire Brick &
STATEN ISLAND
CLAY RETORT WORKS,
Established 1845.

Office, 58 Goerck Street, cor. Delancy Street,
East River, New York.

The largest stock of Fire Brick of all shapes and
sizes on hand, and made to order at short notice.
Cupola Brick, for McKenzie Patent,
and others. Fire Mortar, Ground Brick, Clay and
Sand. Superior Kaolin for Rolling Mills and Foundries.
Stone Ware and other Fire Clay and Sand,
from my own mines at New Jersey and Staten Island,
by the cargo or otherwise.

Philadelphia Fire Brick
AND
Clay Retort Works,
AND KENSINGTON FIRE BRICK WORKS.
Office, 33d and Vine, Philadelphia.

PHILIP NEWKUMET,
Successors to JOHN NEWKUMET, Proprietor
manufactures 9-inch Fire Bricks, Tiles, and Blocks,
for Rolling Mills, Blast Furnaces, Foundries, Gas
Works, Lime Kilns, Glass Houses, &c., &c.
Articles of every description made to order at
short notice, and in a very superior manner.
"CLAY RETORTS FOR SUGAR HOUSES."

TRENTON
Fire-Brick and Terra-Cotta Works.
Fire-Brick, Blast Furnace Blocks
Of all shapes and sizes, Fire Clay, &c.
Stoneware, Drain and Sewer Pipes, from 2
to 18 inches bore. Terra-Cotta Chimney Tops, Chimney
Flues, Garden Vases, &c. Send for Price List and
Illustrated Catalogues to
O. O. BOWMAN & CO., Trenton, N. J.
Branch Office, 41 Dey Street, N. Y.

A. HALL & SONS, Perth Amboy, N. J.
ESTABLISHED 1846.
HALL & SONS, Buffalo, N. Y.
ESTABLISHED 1866.

FIRE BRICK
of reliable quality for all purposes, manufactured of the
best New Jersey Fire Clays. Also, MINERAL KNOBS,
ROCKINGHAM WARE, Fire Clay, Fire Sand, Karlin
and Ground Fire Brick.

BLACK LEAD
CRUCIBLES.
Manufactured by
ADAM NEWKUMET,
1537 & 1539 N. Front St., Phila., Pa.,
For Steel, Brass, Nickel, Copper, Bronze, &c.
Equal to any in the market, and all guaranteed.
Keeping a full stock of all sizes on hand, and
being confident of giving entire satisfaction, we re-
spectfully ask consumers to give us a trial.

Watson Fire Brick Manufactory,
ESTABLISHED 1836.
JOHN R. WATSON, Perth Amboy New Jersey,
Manufacturer of
FIRE BRICK,
For Rolling Mills, Blast Furnaces, Foundries,
Gas Works, Lime Kilns, Tanneries, Boiler
and Grate Setting, Glass Works, &c.
FIRE CLAYS, FIRE SAND, AND KAOLIN FOR SALE.

Salamander & Albany Fire Brick Works
Rathbone St., Albany, New York.
PALMER, NEWTON & CO.,
Manufacturers of FIRE BRICK of every shape
for Gas Works, Tanneries, Lime Kilns, Rolling Mills,
Blast Furnaces, Glass Works, Stone, Range and Heater
Lining; Fire Clays, Kaolin, Fire Sand, Fire Cement,
by cargo or barrel. Orders filled on short notice.

Brick Presses,
BRICK PRESSES,
For Fire and Red Brick.
PATENT STEAM GEARING
For grinding Clay for Red or Fire Brick, and all
kinds of Brick Machines in general.
Works, 1819 Germantown Ave., Phila.
GEO. CARNELL.

Oldest and Largest Establishment of the kind in the U. S.
F. L. & D. R. CARNELL,
1814 Germantown Avenue, Philadelphia.
Manufacturers of Pennsylvania Brick Machine,
Little Giant Pipe Machine, Fire and Red Brick
Presses, Clay Wheels, Tile Machines, Stampers,
Grinding Pans, Brick Yards fitted out for running
by steam or horse. Heavy and Light Castings. Send
for circular.

JOHN MAXHEIMER

Manufacturer of
- FULL SIZE OF -
WIRE CONNECTION
JAPANNED and
PATENT EUREKA
Bright Metal

BIRD CAGES,
Nos. 247 & 249 Pearl Street,
NEW YORK.

L. S. BOYER & CO.,
Wholesale dealers in
Anthracite & Bituminous Coal & Coke.
Selling Agents for
GEORGE'S CREEK CUMBERLAND COAL,
Mined by the Hampshire & Baltimore Coal Co.
OFFICES: 70 Broadway, N. Y.
220 Walnut St., Philadelphia.

B. W. PERSONS,
Broker and Dealer in
Anthracite and Bituminous Coals,
SCOTCH & AMERICAN PIG IRON,
No. 39 Weybosset Street, Providence, R. I.

New Patents.

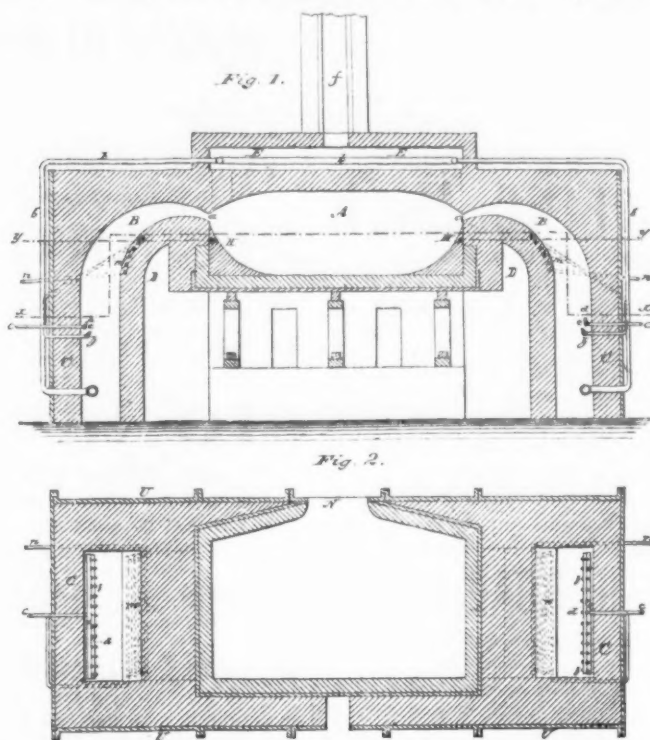
We take from the records of the patent office
at Washington the following specifications of
certain patents lately issued, which will be found
interesting:

IMPROVEMENT IN THE MANUFACTURE OF STEEL.
Specification forming part of Letters Patent
No. 137,885, dated April 15, 1873, issued to
James G. Blunt, of Leavenworth, Kansas.

This invention relates to puddling furnaces,
and consists in the construction of the same,
and the novel arrangement of devices, whereby
petroleum-vapor or fixed hydrocarbon-gas, with
or without superheated steam or free hydrogen,
is used as a fuel in such furnaces. The object of
this invention is to manufacture steel direct from
the pig or cast iron, and of superior quality, and
at a much less cost than by any other known
process, by reason of puddling or decarbonizing
the metal with the petroleum-vapor or pure
hydrocarbon flame, whereby all sulphur and
other impurities are decomposed, eliminated,
and driven off in the form of vapor, and after
which the metal or iron, while in its molten
state, is injected or charged with petroleum in

it is charged with pig or cast iron, which is
melted, boiled, and puddled in the usual man-
ner. After the molten metal is sufficiently puddled
and manipulated to decarbonize it and
free it from its impurities, and when in that
state in which the slag or clinder is about to
separate from the iron, the air blast is turned
off from the furnace and sufficient petroleum
vapor or gas admitted into the oven A to pre-
vent the admission of air, while, at the same
time, the valve admitting the petroleum vapor
or gas into the gas pipe H is opened, and the
petroleum vapor or gas is thus introduced
through the small pipes or jets directly into
the mass of molten metal in any required quan-
tity, and, by this direct introduction of petro-
leum vapor or gas, carbonizing the metal to
make any grade of steel desired, after which
the mass is balled and treated in the usual
manner with the squeezers or hammers and
rolls, and the furnace again charged with pig
iron, and thus the operation repeated.

When superheated steam is used it is taken
from any steam boiler, and, passing through the
pipe n and the superheater m, is conveyed to
the combustion chamber B, and there mixed



IMPROVED PUDDLING FURNACE.

vapor, or carbon-gas, which immediately be-
comes diffused throughout the mass of metal,
carbonizing the same to any desired extent, and
converting it into steel.

Figure 1 represents a vertical section of the
furnace. Figure 2 represents a horizontal section
on line x x.

In the drawing, A represents the oven for
melting and boiling the metal, which is of an
oval and elongated form. B represents a com-
bustion chamber or fire flue at either end of the
furnace. These combustion chambers extend
upward in a vertical line to a point on a line
with the bottom or hearth of the oven A, then
contracting and tapering as they traverse in a
curved line upward and inward to the narrow
opening a into the oven of the furnace. E rep-
resents a chamber above the roof of the oven
A for heating the air in the pipes b b. In each
of the four corners of the roof of the furnace
proper is an opening or flue for the passage of
the flame from the oven A, which flame, pass-
ing around the air pipe b b, passes off through
the stack or chimney f. c represents the pipe
for the introduction of the petroleum vapor or
hydrocarbon gas through the wall of the fur-
nace C into the combustion chamber B, termi-
nating in a cross head, e, provided with jets or
burners d. b b represent a large iron pipe or
flue for conveying and heating the air. This
flue, after passing through the wall and enter-
ing the chamber E, doubles back and forth
within the said chamber over its whole extent,
and then, bifurcating or dividing into two flues,
conveys the air to the combustion chamber B.

When superheated steam is used in conjunc-
tion with hydrocarbon, the ordinary steam is
conveyed in a pipe, n, through the wall of the
furnace at the side of the combustion chamber
B, until it reaches a point near the commence-
ment of the curve in the bridge wall of the fur-
nace D, and then passes backward and forward
in a number of folds or convolutions, m, on said
bridge wall (protected from the intense heat
by a thin layer of fire-brick or clay), and thence
back through the furnace wall and into the
combustion chamber B, terminating in cross
heads and jets just above the gas burners.

U represents the frame work of the furnace.
N, Fig. 2, represents the doors provided for ob-
taining access to the interior. H is a gas pipe,
which passes through the wall of the furnace
and extends around the oven above the level
of the melted iron, and within the furnace walls,
so as to be protected from the action of the great
heat, and from which a number of small pipes
or jets (made of plumbago or other fire-proof
material) project downward and inward, and
terminate in the oven near its bottom or hearth,
and through which the petroleum vapor or car-
bon gas is introduced directly into the molten
matter.

The operation of the furnace is as follows:
The air blast being turned on, the valve in the
gas pipe c is opened and the petroleum vapor
or hydrocarbon is ignited in the combustion
chamber B, which, in combination with the air
from the blast, produces an intense and pure
flame, which passes through the throat of the
flue a, in a broad and narrow sheet, into the
oven A. When the oven is sufficiently heated

with the petroleum-vapor and air; but the more
preferable manner to use superheated steam is
to first pass the same from the superheater m
through a retort filled with charcoal and heated
to such a degree as to combine the oxygen of
the steam with the carbon of the coal, forming
a carbonic oxide and freeing the hydrogen, and
using the same in the form of a fixed hydrogen
gas, which prevents the oxidation of the metal,
which might otherwise occur in the use of sim-
ple superheated steam.

The petroleum-vapor or hydrocarbon to be
used in this furnace may be produced by any
suitable generator in use for that purpose, and
the steam from any ordinary steam boiler, while
the air blast can be supplied by any well known
apparatus.

Claim—1. The gas-pipe H and connections, in
combination with the oven A.
2. Superheater m, in combination with the
combustion-chamber B, the gas-pipe C, and air-
flues b b.
3. The heating-chamber E, in combination
with the oven A, the air-flues or pipes b b, and
the stack f.
4. The process of manufacturing steel from
pig or cast iron, the same consisting in boiling
or puddling the iron to a point at or near what
is known as "coming to nature," and then re-
carbonizing and converting the same into steel
by means of petroleum-vapor or hydrocarbon-
gas.

**Suggestions Concerning Blast Furnace
Management.**
TRIGO FURNACE, TRIGO CO., KY.,
June 7th, 1873.
To the Editor of The Iron Age: The writer
having, for a long period, been engaged in
the iron business in the capacity of founder,
especially in the conversion of a variety of
different kinds of ores to charcoal foundry
iron, proposes, through the columns of your
excellent paper, to give such of your readers as
are interested in this particular branch of the
trade some items of his own experience in the
preparation of the stack, and the various pro-
cesses of manipulation in its passage through
the furnace to insure a desirable quality of iron.
Every one conversant with the trade under-
stands how difficult it is to go into the market
and obtain a supply of No. 1 foundry iron, the
quality of which in all respects exactly suits the
wants of the consumer; and yet there are hun-
dreds of charcoal furnaces, a large majority of
which are striving to supply this particular de-
mand, which, of itself, requires only a small pro-
portion of the production of the country. Ore
containing an undue proportion of sulphur or
phosphorus is not susceptible, under any process
at present known, of producing an unobjection-
able quality of foundry iron. It is only a very few
of the furnaces that are confined to this class of
ores, and such as are not, by the principles of
cause and effect, should be able, without uncer-
tainty, to convert most of their stock into this
desirable product, and it is only through want
of due regard to the interior shape and propor-
tions of the furnaces, the manner of inserting
the blast, the temperature and density (or pres-

sure at tuyere) and volume of same, to a given
amount of ore, coal and lime, that so many iron
masters fail to realize their anticipations. Es-
pecial care should also be taken that the stock
is not only of good quality but properly pre-
pared before it enters the furnace. Some
kinds of ore require less burning than others,
but to produce good foundry iron it must all
contain a certain amount of carbon before it
reaches the fusion point in the immediate
vicinity of the tuyeres. Hence, if raw or un-
burned ore is fed into the furnace, it will re-
quire a greater length of time in its passage to
absorb the requisite amount of carbon, to ac-
commodate which the furnace must be worked
slower than when using well burned ore.
Experience has led to the conclusion that the
interior of a blast furnace is an expensive
place to burn ore. When ore is un-
evenly pulverized, some in coarse lumps
with the remainder fine, in changing from ore
to iron, as it does in passing the tuyeres, the
combination will be mechanical and not chemi-
cal, as it should be, presenting at the fracture
of the pig blotches, or a variety of different
grades of iron, some coarse, some fine, some
hard and some soft, rendering it unfit for the
lathe and inferior for other purposes. A still
greater impediment to the successful work of
the furnace is often found in working sand or
fine dirt, or even pure ore in the form of dust,
in sufficient quantity to obstruct the interstices
among the ore so as to prevent the free egress
of the escaping gases. When this occurs it is
attended not only in loss from quality of iron,
but in a great waste of stock. The nitrogen,
which constitutes about four-fifths of the atmos-
phere, neither burns nor supports combustion,
and emerges from the furnace as it entered, un-
diminished in volume, without any chemical
change whatever. On the contrary, the oxygen
which constitutes the other one-fifth part of the
atmosphere, upon entering the furnace is in-
stantly absorbed by the carbon, and the two
disappear within the zone of rapid combustion
around the tuyeres, the product being carbonic
acid gas, which is a ready extinguisher of fire,
and must not be retained within the furnace at
the point where it is generated—otherwise com-
bustion would very soon be effectually arrested.
The only egress for this gas, together with the
large volume of nitrogen, is through the inter-
stices among the stock, the area of which depends
greatly upon the ore being fine or coarse.
These conditions have a wonderful influence
upon the work of the furnace, and it is to be
regretted that the subject does not receive
more attention from the producers of iron.
For instance, if the ore is too coarse, especially
where the top of the furnace is large, these
non-combustible gases pass away too freely,
thereby extending the zone of rapid combus-
tion beyond the requisite limits for good work,
greatly diminishing the intense local heat in-
dispensable for the instant and perfect fusion
of the ore in passing the tuyeres. On the con-
trary, if the ore is too fine or contains, as be-
fore stated, a sufficient amount of sand, clay,
or even the dust from ore, to obstruct the in-
terstices, the work of the furnace will at once
indicate the interior condition of things, in the
diminished volume of flame in the hot blast;
the brilliant white, dazzling lustre of the tuy-
eres will give place to a dead, dull red color,
resulting from the presence of carbonic acid
gas; the temperature of the blast will go
down, and the pressure at the tuyers will go
up; jets of blue flickering flame will make their
appearance around the timp, soon to be followed
by an avalanche of that unprofitable compound
of conglomerate ore, coal, and lime, forcing its
way out over the dam, recognized among the
workmen as a minefall, resulting in the loss of
quality and quantity of iron.

The writer, although always an advocate of
separating dust of any kind from ore, was never
fully impressed with its importance until he
commenced using Hillman's pneumatic revol-
ving ore cleaner, described in your issue of June
5th, when it was soon found that ore prepared
in the ordinary way, and supposed to be reason-
ably clean, contained an amount of dust that
greatly retarded the work of the furnace. The
great problem to be solved to insure success in
the iron business is in working the stock eco-
nomically. It matters not how cheaply it may
have been procured, or how desirable the qual-
ity, if wasted in the furnace, dividends will not
be forthcoming.

Vienna Exposition Notes.

VIENNA, May 22, 1873.—There is a rumor that
the Director General of the Exhibition, Baron
Schwarz, has advised the government that the
16,000,000 guilders voted by Parliament will not
be sufficient to cover the cost of the Exhibition
palace, and that 2,000,000 guilders additional
will be required to finish the building and make
certain repairs. Even assuming the rumor to
be unfounded, the final result is certain to show
a large deficiency of receipts below expendi-
ture. The unexpectedly slim attendance thus
far of foreign visitors has caused a great many
hotel owners to come down considerably in
their rates of lodging. Rooms by the month in
private families have also fallen to a compar-
atively moderate rent.

VIENNA, May 23, 1873.—At no previous time
anywhere in the western world has China been
as extensively represented, from an industrial
point of view, as it is on the present occasion
at the International Exhibition here. Austria,
through the energy of its consular representa-
tives, and the Chinese government through
proclamations, financial help, and a removal of
the export duty, had, as far back as 1870, taken
the necessary steps to propitiate the forwarding
of goods from all quarters in the realm; and
the Christian missionaries have contributed
their share to the good work of enlightening
Chinese manufacturers upon the subject of the
general desirableness that China should
show forth its productive powers. The mag-
nificent array we now admire comprises, among
articles made of metal: from Shansee, beside
raw iron and steel, all the various tools, &c.,
and especially pins and needles, manufactured
therefrom; cutlery and other steel ware, from
Honan; articles of copper from Szechuen;
also, porcelain, clay and china ware, together
with all the dyes applied to them, from
Kiang-se; and, finally, japanned ware and
jewelry from the Kuang provinces.

Iron.
NEW YORK.
GAM'L G. SMITH & CO.,
IRON WAREHOUSE,
342, 344 & 346 Pearl Street, New York.
Importers and Dealers in
IRON STEEL,
COMMON AND REFINED BAR IRON,
SHEET AND PLATE IRON,
Rod, Hoop, Band, Scroll, Horse Shoe,
Angle and Tee Iron,
PIG IRON,
OLD RAILS,
WROUGHT IRON BEAMS.
Iron of all sizes and shapes made to order.

PIERSONS & CO.,
Established 1790,
24 & 26 Broadway, 77 & 79 New St.,
NEW YORK CITY,
AGENTS

Ulster Iron.

All sizes and shapes kept in stock.

JACKSON & CHACE,
206 & 208 Franklin St., N. Y.,
Importers and Dealers in
IRON and STEEL.



Agents for
JOHN A. GRISWOLD & CO'S
Bessemer Steel.
Agents for
UNION IRON MILLS,
Wrought Iron
Beams,
ANGLE and T IRON.
Special Irons for Bridge and
Architectural Work.

ABEEL BROTHERS,
Successors to JOHN H. ABEEL & CO.,
Iron Merchants,
190 South Street and 365 Water, N. Y.
ULSTER IRON

A full assortment of all sizes constantly on hand.
English and American Refined Iron
of choicest brands.
Common Iron.
Band, Hoop and Scroll Iron.
Sheet Iron.
Norway Nail Rods.
Norway Shapes.
Cast, Spring and Tire Steel, etc.

Alfred R. Whitney,
Importer and Dealer in
IRON STEEL,
Well assorted stock of
Angle and T Iron,
To 30 feet in length, constantly on hand.
56, 58 & 60 Hudson, and 49, 51 & 53 Thomas Sts., N. Y.
English and American Manufacturers'
AGENT FOR IRON
Used in Construction of
Fire-Proof Buildings, Bridges, &c.
Books containing Cuts of all Iron now made, sent by
mail. Sample Pieces at office.
Please address 58 Hudson Street.

BORDEN & LOVELL,
Commission Merchants
70 & 71 West St.,
New York.
Agents for the sale of
Fall River Iron Co.'s Nails,
Bands, Hoops & Rods,
AND
Borden Mining Company's
Cumberland Coals.

A. B. Warner & Son,
IRON MERCHANTS,
28 & 29 West and 52 Washington Sts.
BOILER PLATE,
Boiler Tubes, Angle, Tee & Girder Iron,
Boiler and Tank Rivets.
Sole Agents for the celebrated

"Eureka," Pennocks,
"Wawasset," Lukens,
Brands of Iron. Also all descriptions of Plate, Sheet,
and Gasometer Iron. Special attention to Locomotive
Iron. Fire Box Iron a specialty.

ASBESTOS FELTING,
For Steam Boilers, Pipes, &c.,
saves 25 to 40 per cent in fuel. The best in use
Durable and Economical.
For circulars and prices, address
DAVIDGE & WHEELER,
General Agents Asbestos Felting Co., of New York
P. O. Box, 4870. 781-2 Pine St., N. Y.

Iron.
NEW YORK.
Conklin & Huerstel,
Successors to M. W. DEAN,
"IRON MERCHANTS,"
99 Market Slip, N. Y.
Keep constantly on hand a full assortment of
English and American Refined Iron,
COMMON IRON,
Band, Hoop and Scroll Iron,
Norway Nail Rods and Shapes,
Cast, Spring, Toe Calk and
Tire Steel.
Goods Shipped free of Cartage.

WM. GARDNER,
575 Grand, 414 Madison & 309 Monroe Sts.
Bar, Hoop, Rod, Band and
Horse Shoe Iron.
AGENT FOR
Best Norway N. R. & Shapes,
Spring, Toe Calk, Tire & Sleigh Shoe Steel.

POWERVILLE
ROLLING MILL,
JOHN LEONARD, Proprietor,
450 & 451 West Street, NEW YORK.
Manufacturer of all sizes of **MERCHANT**
IRON and HOOPS. Also Manufacturer of
Best Charcoal Scrap Blooms.
And Dealer in Old and New Iron,
Steam Engines, Boilers and Tanks.

GILEAD A. SMITH & CO.,
Bartholomew House, Bank, No. 30 Pine St., N. Y.
London. P. O. Box No. 5070.

RAIL ROAD IRON
In Ports of New York & New Orleans.
Steel Rails of most approved Makers.
Importers of Old Iron Rails for re-rolling.
Bills of Exchange on Imperial Bank, London.

Edward Page & Co.,
(Successors to Frykberg & Co.,)
Swedish & Norway Iron,
Boston Rolling Mill,
SHAPES, NAIL RODS AND
WIRE RODS,

OFFICES:
17 Batterymarch Street, BOSTON,
22 William Street, NEW YORK,
205 1-2 Walnut Street, PHILA.
GOTHENEURG, SWEDEN.

Marshall Lefferts, Jr.,
94 Beekman St., New York,
MANUFACTURER OF
AMERICAN
Galvanized Sheet Irons

AND AGENT FOR THE
Easton Sheet Iron Works, Easton Pa.
MANUFACTURER OF
Best Bloom, Charcoal & Refined Sheet Iron.
Galvanized Telegraph and Fence Wire
Galvanized and Tinned Roofing and Siding
Nails.
Galvanized Tea Kettles.
Galvanized Hoop Iron of all widths.
Galvanized Staples.
Corrugated Iron for Roofing, plain or gal'd.
Galvanized Bars and Chains for Cemetery
Railings.

T. B. CODDINGTON & CO.,
25 & 27 Cliff St., New York.
Bar Iron, Sheet Iron, &c
Of every description



The Moseley Iron Bridge & Roof Co., No. 5 Day
St., N. Y. Wrought Iron Bridges, Corrugated Iron
Poles, Rollings, Doors, Shutters, Corrugated Iron
straight or curved. Also Manhattan Iron Roofing.

Iron.
NEW YORK.
HAZARD & JONES,
BROKERS.
NEW & OLD RAILS,
FOREIGN AND DOMESTIC
Pig Iron,
Wrought & Cast Scrap Iron, &c.,
212 Pearl St., New York.



WILLIAM H. PETIT,
BROKER IN IRON,
72 Wall Street, N. Y.

JAMES WILLIAMSON & CO.,
SCOTCH AND AMERICAN
PIG IRON,
No. 69 Wall St., New York.

B. F. JUDSON,
SCOTCH AND AMERICAN
PIG IRON,
Wrought and Cast Scrap Iron,
457 and 459 WATER STREET,
And 235 SOUTH STREET, near Pike,
NEW YORK.

JOHN W. QUINCY,
98 William Street, New York
Dealer in
Anthracite & Charcoal Pig Irons,
OLD SCRAP and CUT NAILS.
Gibbs' Patent Lock Nut and Washer, and
Fish Plates for Rail Roads.

BOONTON
CUT NAILS,
HOT PRESSED NUTS,
Machine Forged Bolts,
Washers.
Fuller, Lord & Co.,
BOONTON IRON WORKS,
139 Greenwich Street, New York.

Swedish Iron.
A Variety of Brands, including
IB HP 03
BARS suitable for Steel of all grades, Wire, Shov-
els, Hoes, Scythes, Carriage Bolts, Nail Rods,
Tacks, etc.
CHARCOAL PIG IRON for Bessemer and
Cast Iron.
MUCK BARS for Steel Smelting and Re-rolling.
SCRAP or BAR ENDS.
Direct Agency for N. M. HÖGLUND, of
Stockholm, represented in the United States by
NILS MITANDER,
69 William St., New York.

DANIEL W. RICHARDS & CO.,
Importers and Dealers.
SCRAP IRON,
Pig Iron,
OLD METALS.

YARDS:
88, 90, 92, 94, 96, 98, 100, 102 & 104 Mangin St.
And 71, 73, 75 77 & 79 Tompkins St.
OFFICES,
92 Mangin Street,
178 Pearl Street, near Pine Street.

The Corrugated Metal Co.
D. F. Townner, East Berlin, Ct. C. A. Roys, Secy.
Pres. & Treas. N. C. North, Supt.
MANUFACTURERS OF PATENT CORRUGA-
TED FIRE-PROOF SHUTTERS, ROOFING, SIDING,
LATH, CEILING, FLOORING, SHINGLES, &c.
Work in our line put up in all parts of the country,
and guaranteed satisfaction.

P. W. GALLAUDET,
Banker and Note Broker,
Nos. 3 and 5 Wall Street,
NEW YORK.
HARDWARE, METAL, IRON, RUBBER, SHOE,
PAPER AND PAPER-HANGINGS, LUMBER, COAL,
AND RAILROAD PAVER WANTED.
ADVANCES MADE ON BUSINESS PAPER AND
OTHER SECURITIES.

Iron.
NEW YORK.
S. W. HOPKINS & CO.,
57 Broadway, New York.

WE BEG TO ANNOUNCE TO AMERICAN ROLL-
ing Mills and Iron Manufacturers, that we are con-
stantly receiving, from both American and Foreign Rail-
road Companies, heavy shipments of

OLD RAILS,
and are therefore always in a position to furnish to con-
sumers any quantity desired for immediate or remote de-
livery; and when required will contract to supply Mills
with their monthly or yearly consumption at the lowest
current market prices. We are also prepared to receive
orders for

SCRAP IRON,
both Wrought and Cast, of every description, and have
always a supply at dock, and to arrive. Great care
is taken in properly selecting and classifying the same
by our

LONDON HOUSE,
58 Old Broad Street,
who give this department of our business their personal
attention. When preferred, we are ready to execute
orders from abroad at a sterling price, charging a com-
mission for our services.

S. W. HOPKINS & CO.
HARRISON & GILLOON
IRON AND METAL DEALERS,
558, 560, 562 WATER ST., and 302, 304, 306 CHERRY ST.,
NEW YORK.

have on hand, and offer for sale, the following:
Scotch and American Pig Iron, Wrought, Cast and
Machinery Scrap Iron, Car-Wheels, Axles and Heavy
Wrought Iron; also old Copper, Composition, Brass,
Lead, Pewter, Zinc, &c.

JAMES T. MAGUIRE,
MANUFACTURER
Builders' Wrought Iron Goods,
HOOBS HASPS AND STAPLES,
Awning Hooks, Corner Irons, Rings, Meat
Hooks, Horse S. Pincers, Tongues, &c.
See Price List.
Messrs. WM. F. SHATTUCK & CO., 115
Chambers Street, Agents, &c.
Manufacture, 606 E. 11th St., New York.

OXFORD IRON CO.,
Cut Nails and Spikes,
R. R. Spikes, Splice Bars and
Nuts and Bolts,
81, 83 & 85 Washington, near Reitor St, N. Y.
COLLIER & SCRANTON, Agents.

DAVID CARPENTER,
Manufacturer of
HOT PRESSED NUTS,
And Dealer in
All kinds of Refined Bar & Horse Shoe Iron,
402 Water Street, New York.

THE SPRINGFIELD IRON COMP'Y,
SPRINGFIELD, ILLINOIS,
Is now ready to receive orders for the manufacture of
IRON RAILS,
Of a quality second to none.
Capacity of Works, 25,000 tons per annum.
Chas. Ridgely, Pres. J. W. Bunn, Vice Pres
George M. Brinkerhoff, Secy
E. A. Richardson, Supt
Agent in New York,
GEORGE T. DAVIS, 47 Exchange Place.

BURDEN'S
HORSE SHOES.

"Burden Best"
Iron.
Boiler Rivets.

Burden Iron Works, H. Burden & Sons,
Troy, N. Y.

Established in 1849.

THE
Jackson & Woodin Mfg. Co.

Successors to JACKSON & WOODIN,

Manufacturers of
Car Wheels and Cars,
BERWICK,
COLUMBIA, CO., PA.

Iron.
PITTSBURGH.
Pittsburgh Foundry.
A. GARRISON & CO.,
Manufacturers of

CHILLED AND SAND
ROLLS,
Of acknowledged superior quality, at the lowest cur-
rent prices.

**Ore and Clay Crushers, and Roll-
ing Mill Castings,**
of every description.
Office and Warehouse, 209 Liberty Street,
PITTSBURGH, PA.

PENNSYLVANIA IRON WORKS.
EVERSON, GRAFF & MACRUM,
Pittsburgh, Pa.
Manufacturers of every description of
Bar, Sheet and Small Iron,
Make a specialty in
Fine and Common Sheet Iron.

AMERICAN IRON WORKS.
Jones & Laughlins,
Manufacturers of
Bar Plate and Sheet Iron,
Nails, Ship and Railroad Spikes, RR. Splice Bars and Bolts,
Celebrated Cold-Rolled Shafting, Piston Rods, &c.
PITTSBURGH, PA.
40 42 and 44 River Street CHICAGO.
Stocks of Cold-Rolled-shafting in store and for sale by
Messrs. FULLER, DANA & FITZ, Boston, Mass.
Messrs. GRUBBIE, JONES & CO., New York. Messrs.
PEIRCE & WHALING, Milwaukee, Wis.

SOLAR
IRON WORKS.

Wm. Clark & Co.

MANUFACTURERS OF
HOOP, BAND
AND

SCROLL IRON,
Railroad St., above 33d,
PITTSBURGH PA.

W. P. TOWNSEND & CO.,
Manufacturers of
WIRE and
Black and Tinned Rivets
OF CHOICEST CHAMICAL IRON.
Rivets any diameter up to 7-16 inch and ANY LENGTH
required.
19 & 21 Market St., PITTSBURGH PA.

Boston Rolling Mill
Manufacture extra quality small Rods, from best se-
lected Scrap Iron
Swedish and Norway Shapes,
NAIL and WIRE RODS.
Also HORSE SHOE IRON.
W. R. ELLIS & CO., Proprietors.
Office, 17 Batterymarch St., Boston

"PEMBROKE"
Round, Square & Flat Iron.
"FRANCONIA" Shafting & Bar Iron.
Extra quality when great strain or superior finish
is required. Also, Irons for ordinary work, like the
"ENGLISH REFINED."
WM. E. COFFIN & CO.,
No. 8 Oliver Street, Boston.

HALL, KIMBARK & CO.,
IRON,
STEEL, NAILS, HEAVY HARDWARE.
89, 92 & 94 Michigan Ave., Chicago.

LYNCHBURG IRON WORKS,
F. B. DEANE, Jr., & SON, Proprietors,
LYNCHBURG, VA.,
MANUFACTURE
RAILROAD, BOAT & COUNTERSUNK HEAD
SPIKES, FISH PLATES & BOLTS,
Bridge Rods, Hexagon, Square, T and But-
ton Head Bolts, Bolt Ends, Rivets, Car
Wheels from best Cold Blast Ch. reol Iron,
Locomotive, Car, Engine and Bridge Cast-
ings, Chilled Rolls, Rolling Mill and Blas
Furnace Castings.

BONNELL, BOTSFOED & CO.,
Youngstown, O., Wholesale Dealers in
Bar, Boiler, Hoop & Sheet Iron,
NAILS and SPIKES,
Gas Pipe, Nuts and Washers, Carriage Bolts,
Swedes Iron, Cast Steel, Spring Steel, &c.

W. & B. DOUGLAS,

MIDDLETOWN, CONN.

The Oldest and Most Extensive Manufacturers of

**PUMPS,
HYDRAULIC RAMS,
GARDEN ENGINES**

AND OTHER

Hydraulic Machines

IN THE

UNITED STATES.

Several Hundred Kinds, Styles and Varieties of these Articles in Large Stock, constantly on hand.

Highest Medal awarded them by the Universal Exposition, at Paris, France, in 1867.

Descriptive Catalogues and Price Lists sent when requested.

BRANCH WAREHOUSES.

85 & 87 John Street, NEW YORK.

AND

197 Lake St., CHICAGO, Ill.

**UNION MANUFACTURING COMPANY,**

Manufacturers of all styles

PLAIN AND ORNAMENTAL

Cast, Fast & Loose Butts,

Drilled and Wire Jointed.

Japanned, Flanged Enamelled, Nickel Plated, with and without Cap, and Real Bronze Butts. Also, a full line of

IRON AND BRASS PUMPS,

Cistern, Well, and Force Pumps, Yard, Drive Well, Garden Engine and Steam Boiler Pumps, Hydraulic Rams, etc., and all with the most modern improvements.

Fine Castings a Specialty.

NEW BRITAIN, CONN.

Warehouse, 55 Chambers Street, NEW YORK

Send for New Illustrated Catalogue and Price List.

**THE LARGEST
PUMP WORKS,
IN THE WORLD.**

Over 800 different styles

Pumps, Steam Pumps, Rotary Pumps, Centrifugal Pumps, Piston Pumps,

for Tanners, Paper Mills, Fire Purposes, suitable for all situations imaginable. Send for Catalogue. Address

RUMSEY & CO.,

SENECA FALLS, N. Y.

ALSO, FOR

Hand Fire Engines,

Address RUMSEY & CO., Seneca Falls, N. Y., U. S. A.

**W. S. BLUNT, 77 Beekman Street, New York.
The People's Pump.**

Plumbers and the Jobbing Trade are respectfully invited to call and examine our goods and send for Catalogue and Price Lists. Our Force Pumps are the most compact and powerful in the market.

**In Door & Out Door Force Pumps,
DEEP WELL PUMPS,**

Iron Standard Yard Force Pumps.

PATENT DOUBLE ACTING HYDRAULIC RAMS

a specialty, and the best in the market. Also

GARDEN ENGINES, new and improved pattern.

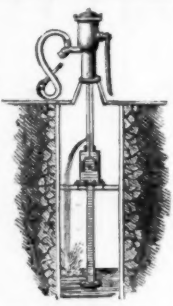
Patent "Mushroom Strainer"

for all Suction Pumps.

Will draw in three inches of water without disturbing the bottom, even if water is let out of pump. Very useful for pumping out cellars, drawing liquid from tanks, when sediment is to be avoided. The Patent Mushroom Strainer received Bronze Medal of Special Award, American Institute, 1872. Agents for the Pacific Coast and Territory west of the Rocky Mountains:

Conroy, O'Connor & Co.,

San Francisco, Cal.

**E. M. CHAPIN,**

MANUFACTURER OF

RULES, PLANES, GAUGES,

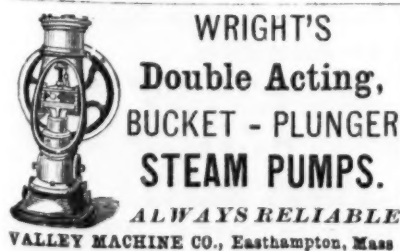
Levels, Hand and Bench Screws, etc., etc.

Established in 1826 by H. Chapin.

Manufacturing Address,

H. CHAPIN'S SON,

PINE MEADOW, CONN.



WRIGHT'S

**Double Acting,
BUCKET-PLUNGER
STEAM PUMPS.**

ALWAYS RELIABLE

VALLEY MACHINE CO., Easthampton, Mass.

Woodward Steam Pump Mfg. Co.
Steam Pump and Fire Engine,
Steam, Water and Gas Fitting of all kinds.Also, Wholesale and Retail dealers in WROUGHT
IRON PIPE, BOILER TUBES, etc.Woodward Building, Nos. 76 & 78 Centre St.,
corner Worth Street, NEW YORK.

GEO. M. WOODWARD, Pres.

**On the Molecular Changes Produced in
Iron by Variations of Temperature.**

BY PROFESSOR R. H. THURSTON.

(Continued.)

25. In comparing the conclusions deduced by the several experimenters, of whose labors the following is an abstract, some evident misconceptions will be noted, which plainly arise from the very common error of attempting to estimate the strength of materials from experiments in which they are tested by shock, forgetting that a material may be immensely strong, and yet, if brittle, non-resilient, may be readily broken by a blow which would leave uninjured a less tenacious, but more ductile, specimen.

It has evidently been quite unsuspected, by the majority of experimenters, and of writers on this subject, that change of temperature may, while producing an alteration of the cohesion of metals, effect a directly opposite change in its ductility, and that, consequently, the substance may exhibit greater tenacity, and may, therefore, better resist a steady strain, while at the same time its ductility may be so greatly decreased by the same cause as to greatly lessen its resilience, and thus, though stronger, it may be less capable of resisting shocks.

29. A committee of the Franklin Institute, of the State of Pennsylvania, consisting of Professor W. R. Johnson, Benjamin Reeves, and Professor A. D. Bache, were engaged, during a period extending from April, 1882, to January, 1887, in experiments upon the tenacity of iron and of copper, under the varying conditions of ordinary use.

The effect of change of temperature upon those metals was investigated with equal intelligence and thoroughness, and most valuable results were obtained.

30. Upward of one hundred experiments upon copper, at temperatures ranging from the freezing point up to 1000° Fahrenheit, exhibited plainly the fact that a gradual diminution of strength occurs with increase of temperature, and vice versa, and that the change is as uniform as the unavoidable irregularities in the structure of the metal would allow.

The law of this variation of tenacity, within the limits between which the experiments were made, was found to be closely represented by the formula,

$$D = C(T - 80)^{-1/2}$$

i. e., the squares of the diminutions of tenacity vary as the cubes of the observed temperatures measured from the freezing point.

31. The committee, in the course of their exceedingly judicious and complete series of deductions, say:—

"The temperature of no tenacity is generally supposed to be that at which the fusing point of the given substance is placed, and the point of maximum tenacity ought upon general principles to be found at the point at which least heat prevails, that is, at the natural zero, or point of absolute cold, if such a point exists in nature.

"Between these two extremes, it might be supposed that the tenacities of different substances, particularly such as are capable of passing immediately from the solid to the liquid state, would be found to obey certain laws.

"As the total cohesion, at the maximum, would present, to a mechanical agent tending to overcome it, the whole of its resistance, and as, at more elevated temperatures, a part of that tenacity would be overcome by heat, and the rest would be destroyed by the mechanical force, it is evidently a question of experiment to decide what relation the two forces have to each other, at the temperatures between the two extremes to which we have just alluded.

"To decide the theoretical question, or, in other words, to deduce from the experiments a law which might be expressed in an abstract form, corresponding to all the possible phenomena, would require a state of the materials different from that usually found in commerce or employed in the arts.

"It would also, as we have seen, require a knowledge of that about which philosophers, no less than practical men, are far from being agreed, namely, the point of absolute cold."

32. The committee do not fail to observe that there are indications that the curve, of which their formula is an approximate equation, has, very probably, a point of contrary flexure at a temperature somewhat below the highest at which they were able to experiment, or, near the point at which one half the tenacity of the material is destroyed.

This inflection of the curve, which indicates that no parabolic formula can be made to represent, accurately, the change of tenacity with varying temperature, is very clearly exhibited in the curve laid down from the experiments on the strength of wrought iron, which were next made by the committee.

33. These experiments were 73 in number, at temperatures between 212° and 1317° Fahr., and comparisons were made with the strength of the same bars, at ordinary temperatures, as determined by 163 experiments.

The bars were generally broken in at sections reduced by the file, and the results give but little indication of the effect of change of temperature upon the resilience and extensibility of the metal; but they afford most interesting, accurate, and valuable measures of the effect of heat upon tenacity.

34. It was this investigation which first disclosed the remarkable anomaly of the existence of a point in the scale of temperatures, usually, if not invariably, considerably above that of ordinary temperature, at which the metal exhibits a maximum of tenacity.

34. By heating a number of bars to 572° F., which was found to be very nearly the average temperature of maximum strength, and breaking them at that temperature, it was found

* Report of committee, p. 74. Phila.: Merrihew & Gunn, 1887.

that a mean of experiments, on the best qualities of rolled iron, gave this maximum as 15-17 per cent. higher than the tenacity of the same samples at ordinary temperatures.*

The irregularity of structure of specimens tested was found to cause an irregular variation of strength amounting to 10 per cent.

35. Taking 80° Fahr. as a standard temperature, the committee discovered that the fifth power of the diminution of tenacity from the maximum, determined as just stated, varied as the thirteenth power of the temperature above 80° Fahr., or,

$$D = C(T - 80)^{-1/5}$$

where D = diminution of tenacity, T = temperature, C = a constant.

At the temperatures of about 400° and 1300°, points of departure from the curve took place as already stated, the deviation from the law expressed by the formula becoming quite marked.

35. The committee made a series of experiments upon the effect of annealing in altering the tenacity of the metal.

They found no measurable change in specific gravity, except with specimens which had been hammer-hardened. The tenacity was diminished to an extent which follows very closely the order of temperature at which annealing was performed, and this loss varied from 2½ per cent., when annealing was performed at low temperature, to 46 per cent., when the metal was annealed from a bright welding heat.

The results seem quite variable, but, at about 1190°, the losses had a mean value of about 15 per cent., while, at a welding heat, they averaged nearly 25 per cent.

In testing old boiler plate, a loss was supposed to have been proven, which was attributed to this cause, and which amounted to about 6 per cent.

Unfortunately, the experiments of the committee do not afford the data requisite for determining the resilience of these specimens, and we are unable to learn whether the observed depreciation of strength was accompanied, as we should expect, by an increase of ductility.

36. No experiments were made at temperatures less than 32°, and it remained for further research to determine the behavior of iron at exceptionally low temperatures.

The work of the committee was most skillfully performed, and most conscientiously recorded and reported. Together with the equally exhaustive and thorough work of the full committee on steam boiler explosions, of which this was a part, it affords most valuable and reliable additions to our experimental knowledge.

These were the first experiments ever made on an extended scale, and the determination of the area of fractured section, the measurement of elasticity, of latent heat, specific heat, the conducting power, and other properties of iron and copper, were made with much greater care than could have been expected at that early period. The committee was engaged in the work nearly five years, and the expenses incurred were defrayed by the United States Treasury Department.

37. A somewhat similar series of experiments was made by Sir Wm. Fairbairn upon rolled iron, and the same behavior was noted, under varying temperatures, as was so well shown by the earlier researches of the committee of the Franklin Institute.

The tenacity of Staffordshire boiler plate was examined at temperatures varying from 0° Fahr. to a dull red heat—probably 1000° Fahr.

This iron is not of high quality, and some marked deviations were observed from the general direction of alteration of strength.

The tenacity of the specimens gradually increased, as the temperatures rose from 60° to 305° F., and thence diminished, until, at a red heat, the strength became reduced to the extent of 25 per cent.

The tenacity recorded at 0° F. was, however, 6 per cent. greater than the mean noted at any other observed higher temperatures, but not greater than that of individual specimens.

38. Other experiments were made upon rivet iron, which was necessarily of better quality than the Staffordshire plate.

The tabular statement of the results shows a gradual and quite regular increase of tenacity from 60° to 325° F., the strength being given at 62,816 and 84,046 pounds per square inch at those points respectively—a difference of 30 per cent. The tenacity then diminished as temperature rose, becoming reduced to 35,000 pounds per square inch at a red heat.

The strength at 30° F. was slightly greater than at ordinary temperatures, the figure given being 63,239 pounds per square inch.

39. Experiments made by Fairbairn on the effect of temperature upon cast iron give less uniform, but still instructive, results.

With No. 3 iron very unsatisfactory and contradictory results were obtained, in consequence of the irregular character of its structure and chemical constitutions.

Cold-Talon iron No. 2 exhibited continual decrease of transverse strength as the temperatures increased. Both cold and hot blast irons were experimented upon, at temperatures ranging from 26° to 190° Fahr. with the following results:

Cold blast, at 26° and at 190°, decreased in strength in the proportion of 874 to 743. Hot blast, at 21° and at 190°, decreased in strength in the ratio of 810 to 731.

It should be remarked that these experiments were made in the early days of hot blast, when the differences in the character of hot and of cold blast iron were more marked than at a later date, when the management of the former had become more generally, and more perfectly understood.

* Report of Committee; p. 213.

† Ibid.; p. 213.

‡ British Association Report, 1856.

§ British Association Report, vol. 6, 1887.

40. Mr. Fairbairn remarks:— "On the whole, we may infer that cast iron, of average quality, loses strength, when heated beyond a mean temperature of 120°, and that it becomes insecure at the freezing point, or under 32° Fahr."

He supposed that the fact that, in some experiments, he found No. 3 iron to increase in strength with rising temperature, is due to its great "irregularity and rigidity."

He also remarks that "The infusion of heat into a metallic substance may render it more ductile and probably less rigid in its nature, and I apprehend it will be found weaker and less secure under the effects of a heavy strain."

41. The experiments of Roebbling, referred to in his report to the officers of the Niagara Falls Suspension Bridge Co., in 1860, do not throw much light upon the question under consideration.

Mr. Roebbling's remark that metal, of as good quality as that upon which he experimented, would be "safe at the North pole," may justify the inference that he supposed that such iron would at least, not lose tenacity when very cold.

42. David Kirkaldy, of Glasgow, in December, 1880, while conducting one of the most extended, accurate and well arranged experimental inquiries, into the value of the tenacity of iron and steel that has yet been made, took occasion to examine the action of frost upon them.

"A bar of Glasgow B. best, ½ inch diameter, was converted into ten bolts, in the ordinary way. Six were exposed all night to intense frost, and tested in the morning with the thermometer at 23° Fahr. The others were kept in a warm place, and carefully protected during testing. Three were tested with gradual, and seven with sudden strains." "When the strain was gradually applied, there was very little difference between the specimens tested in the ordinary condition and the two that were frozen; the former bore 55,177; the latter, 54,385, or 2½ per cent. less. The difference, under sudden strains is somewhat greater, viz., 3½ per cent. less when frozen." This iron was of good quality, and Kirkaldy remarks that "had it been of a coarser description, the difference, when frozen, might have been much greater."

He concludes that "the breaking strain is reduced when the iron is frozen; with the strain gradually applied, the difference between a frozen and an unfrozen bolt is lessened as the iron is warmed by the drawing out of the specimen."

Kirkaldy noticed that "The amount of heat developed is considerable when the specimen is suddenly stretched"—an important circumstance which had previously escaped the observation of experimenters.

43. This subject was debated at some length at meetings of the Manchester Literary and Scientific Society, some two years ago, and experiments were described which afforded data of value and interest.

Mr. William Brockbank described his experiments, made for the purpose of determining the effect of cold upon the cohesion of cast iron. Using a mixture of several irons of quite different qualities (Cleator red hematite, Pontypool and Blaenavon cold blast and Glengarnock hot blast irons, with scrap added), he found a perceptible decrease of strength with decrease of temperature. He noted a similar effect where wrought iron was used. The experience of well known ironmasters was adduced in corroboration of these conclusions, the examples being, usually, instances of breakage by shock. The conclusion of the experimenter was that "bar iron, boiler plate, wire billets and rails are most materially weakened by the action of intense cold, losing their toughness, becoming quite brittle under sudden impact, and having their structure changed from fibrous to crystal line."

44. Sir William Fairbairn stated the results of his experiments, substantially as has been already given, attributing the more frequent breakage of wheel tyres in cold weather, to which allusion had been made, to unequal strains due to shrinkage, rather than to loss of tenacity.

45. Dr. Joule gave an account of his own experiments, upon a smaller scale, made at temperatures of 12° and 55° Fahr., with weights applied without shock. The result indicated an increase of strength at the lower temperatures, in the proportion of 58½ to 59½, or 2½ per cent., as a mean of twelve experiments. Experiments, 41 in number, in which the breakage was produced by shock, gave the opposite result. These experiments were made upon large steel needles, and upon cast nails. They have been sometimes ridiculed as too insignificant to afford valuable evidence, but, insignificant as they may appear, and roughly made as they undoubtedly were, they are valuable as giving corroborative evidence of the fact which has already been quite well proven, that decreasing temperatures, in general, produce increased strength, but decreased elongation and resilience.

He concludes that "Frost does not make either iron (cast or wrought) or steel brittle, and accidents arise from the neglect of the companies to submit wheels, axles, and all other parts of their rolling stock to a practical and sufficient test before using them."

[To be continued.]

Mr. Peters, president of the Lawrence and Monitor Furnace companies, is contemplating the formation of a company for erecting a large stone and coal furnace at Petersburg, opposite the Ashland furnace, where the ore, fire clay and stone coal are in the hills immediately back.—*Ironton (O.) Journal*.

* On the Application of Cast and Wrought Iron to Building Purposes; London, 1844; p. 66.

† Journal Franklin Institute, 1840; vol. 25, p. 58.

‡ Journal of Franklin Institute, 1860; vol. 40, p. 361.

§ Experiments on Wrought Iron and Steel; David Kirkaldy, Glasgow, 1863; p. 85.

¶ Ibid.; p. 95.

¶ Nature, 1871.

Iron.

**Atwater, Wheeler
& Co.,**New Haven, Conn.,
IRON MERCHANTS

AND

Manufacturers.Manufacture in their New Haven
Mill, or import through their Liverpool
House, all grades of**Merchant Iron**

ALSO

**Scrap Iron,
Wire Rods,
Tin Plate, &c.**And invite correspondence with close
buyers in all parts of the country.
Freight from New Haven to all
points West and South same as
from New York.

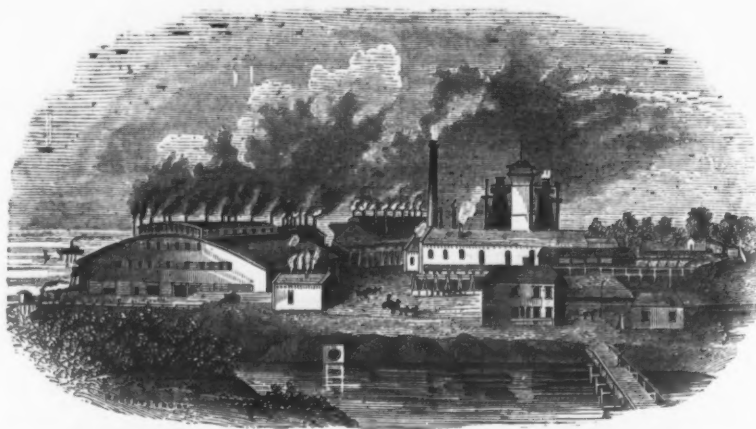
CLEVELAND.

Cleveland Rolling Mill Company,MANUFACTURERS OF
BESSEMER STEEL RAILS,
Steel Plates and Forgings, Railroad Iron, Merchant
Bar, Beams, Girders, Splices, Bolts, Spikes, &c., &c.
O. McC. Nos. 99 & 101 Water St., CLEVELAND, O.
F. STONE, Pres. H. CHISHOLM, V. P. & Gen. Supt.
E. S. PAGE, Sec'y.**Cleveland, Brown & Co.**IMPORTERS, MANUFACTURERS AND DEALERS IN
IRON AND STEEL,
HORSE SHOES, HORSE NAILS,
NORWAY NAIL RODS,
NAILS, SPIKES,
"Standard Taper" Axles & Swedes Iron.
WINDOW GLASS,
Wrought Iron Pipe and Boiler Tubes
Chains, Rivets, Nuts, Washers, and Heavy
Hardware Generally.
25, 27, 29 & 31 Merwin Street,
CLEVELAND, OHIO.**ENTERPRISE IRON WORKS.****Cartwright, McCurdy & Co.**MANUFACTURERS OF
Cotton Tie, Trunk & Woodenware
HOOP IRON,
Band, Scroll and Bar Iron.
General Office & Warehouse, CLEVELAND, O.
Works at Youngstown, O.**Niles Iron Co.,**Manufacturers of
Bar & Sheet Iron,
NILES, OHIO.L. G. ANDREWS, President.
L. E. COCHRAN, Sec'y & Treas.
S. E. BROWN, Gen'l Supt.**OLD DOMINION**Iron and Nail Works Company,
RICHMOND, VA.,
R. E. BLANKENSHIP, Commercial Agent,
Manufacture
NAILS AND BAR IRON,
Bands, Scrolls, Horse Shoe Bars Nut and
Rivet Iron, Spike Rods, Shasting, Bridge
Bolts, Ovals, Half Ovals, Half Rounds, &c.

Iron.

MILWAUKEE IRON CO.,

MANUFACTURERS OF

**RAILROAD IRON**

of Unsurpassed Excellence.

Capacity of Works, 45,000 Tons of Rails per Annum.

E. B. WARD, Prest. ALEX. MITCHELL, Treas. J. J. HAGERMAN, Secy. & Agent.

MILWAUKEE, WIS.

PHILADELPHIA.

**Iron and Steel T and
Street Rails**Of Best American and English Makes.
**CHAIRS, SPIKES, FISH BARS,
RAILROAD SUPPLIES.**
Muck Bars, OLD RAILS, Scrap,
BLOOMS.American and Scotch
PIG IRON, AND METALS.
CHAS. W. MATTHEWS,133 Walnut St., Phila.
[Late RALSTON & MATTHEWS, 133 Walnut St.]**MALIN BROS.,
IRON**Commission Merchants,
No. 228 Dock Street,
3d door below Walnut, PHILADELPHIA.**BLAKISTON & COX,
IRON**Commission Merchants,
No. 333 Walnut Street,
PHILADELPHIA.**CAMBRIA
IRON COMPANY,
JOHNSTOWN, PA.**This Company, by mining the raw materials and
manufacturing the pig metal from a mixture of the
most suitable ores in their own blast furnaces, situ-
ated on both sides of the Alleghany mountains, are
enabled to obtain the various kinds of iron best
adapted for the different parts of a rail. Doing their
own machine work and repairs, and rolling the rail
way bars with the latest improved machinery they
produce**RAILS**of an unsurpassed excellence of quality at the lowest
market rates. The long experience of the present
managers of the Company, and the enviable reputa-
tion they have established for "CAMBRIA RAILS,"
are deemed a sufficient guarantee that purchasers can
at all times, depend upon receiving rails unsurpassed
for strength and wear by any others of American or
foreign make. Any of the usual patterns of iron rail-
can be supplied on short notice, and new patterns of
desirable weight or design will be made to order.
The Company are also preparing to manufacture
Steel Rails by the Pneumatic process. Address**CAMBRIA IRON COMPANY**
218 S. Fourth St., PHILADELPHIA
or at the works, JOHNSTOWN, PA.**S. FULTON & CO.,**
MANUFACTURERS OF
Pig Iron and Cast Iron Gas and Water Pipes.
ALSO HEAVY AND LIGHT CASTINGS
OF EVERY DESCRIPTION.
PLYMOUTH IRON WORKS, CONSHOHOCKEN, PA.
Office, No. 419 Walnut St., Phila.
SAMUEL FULTON. THEO. TREWENT**W. GRAHAM HOOPES,**
Commission Merchant
FOR THE SALE OF
Pig, Bloom, Plate, Bar & Railroad
IRON,
No. 419 Walnut Street, Philadelphia.

PHILADELPHIA.

The Phoenix Iron Co.,410 Walnut St., Philadelphia.
MANUFACTURERS OF
CURVED, STRAIGHT AND HIPPED
Wrought Iron Roof Trusses
BEAMS, GIRDERS, AND JOISTS,
and all kinds of Iron Framing used in the construction
of Iron Proof Buildings.Deck Beams, Channel Angle
and T Barscurved to template, largely used in the construction of
Iron Vessels.Pat. Wrought Iron Columns, Weldless
Eye Bars,
for Top and Bottom Chords of Bridges.Railroad Iron, Street Rails, Rail Joints and
Wrought Iron Chairs.Refined Bar, Shasting, and every variety of
Shape Iron made to order.Plans and Specifications furnished. Ad-
dress
SAMUEL J. REEVES Vice Pres.**George Buchanan.**
(Established 1853.)
Exporter of**OLD RAILS**
IRON AND STEEL RAILS, PIG IRON,
Machinery of every description.
19 BIRCHIN LANE, LONDON, ENGLAND.
Bankers—Messrs. Barclay, Bevan, Tritton,
Tweeds & Co., 54 Lombard Street, London.IRON, NAILS, NUTS, WASHERS, AND CAR-
RIAGE BOLTS.**PACKARD, GOFF & CO.,**
JOHNSTOWN, O.Iron, Nails, Nuts, Washers, and Carriage Bolts.
YOUNGSTOWN, O.
We have three Rolling Mills, a Nut and Bolt Factory
located here. Orders solicited.**Artistic & Enduring
MONUMENTS,**IN GRANITE AND BRONZE.
(Designs remitted by Mail.)
National Fine Art Foundry
218 East 25th Street, New York.**R. D. WOOD & CO.,**
PHILADELPHIA,
Manufacturers of
Cast Iron Water and Gas Pipe,
Lamp Posts, Retorts, &c.
Also, Race & Mathews' Patent Hydrant. This Hy-
drant is perfectly anti-freezing, is the most ornamental
and the cheapest made.
R. PAYNE, Selling Agent.
Office, 175 Broadway, N. Y.**Geo. A. Boynton**
BROKER IN IRON
70 WALL ST. N. Y.

Iron.

CAST IRON FLANGE PIPESOf any length or diameter, for Steam Engines, Exhaust Steam, Fire Purposes, Refineries,
both Faced and Drilled and Plain. Also,
GAS and WATER PIPES
Of all sizes, with necessary connections for
LAMP POSTS, FIRE HYDRANTS,
VALVES, &c.
R. A. BRICK & CO., Mfrs., 112 Leonard St., N. Y.**METALS.****THOMAS J. POPE & BRO.,**
292 Pearl Street, NEW YORK.
PIG IRON—Scotch and American,
Ingot Copper, Spelter, Nickel,
AND METALS GENERALLY.
OLD RAILS, SCRAP IRON, &c
Consignments Solicited on fair Advances.**JESSE W. STARR. BENJ. A. STARR. BENJ. F. ARCHER.**
CAMDEN IRON WORKS
(Established 1824), CAMDEN, N. J.**JESSE W. STARR & SONS,**
Engineers, Contractors and Manufacturers of Gas Apparatus.
And all the
Buildings, Tanks, Holders, &c., required for the Manufacture, Purification, and Storage
of Gas, and Street Mains Requisite for its Distribution.
Plans, Drawings, and Specifications promptly furnished.**IRON FOUNDERS.**CAST IRON STREET MAINS, for Water and Gas, from One and a Half Inches to
FORTY-EIGHT Inches in Diameter.
Stop Valves (all sizes), FIRE HYDRANTS, HEATING PIPES, BRANCHES, BENDS, TEES
CASTINGS of any form or size required.
PHILADELPHIA OFFICE. - - 403 WALNUT STREET.**JOLIET IRON & STEEL CO.,**Joliet, Ills.,
MANUFACTURERS OF
PIG METAL, RAILROAD IRON,
And Bessemer Steel Rails.
Office, 94 Washington Street, CHICAGO.
A. B. MEERER, President. J. H. WRENN, Sec'y and Treas.**TAYLOR IRON WORKS,**HIGH BRIDGE, N. J.,
On the line of the Central Railroad of New Jersey.**CAR WHEELS, CAR AXLES,
DRAW HOOKS & FORGINGS.**
LEWIS H. TAYLOR, President.
W. J. TAYLOR, Treas. & Gen. Man. S. P. BARBER, Supt.
JAS. H. WALKER, Secretary. EDWARD L. BROWN, General Agent.
New York Office, 93 Liberty St.**ATKINS BROTHERS,**PROPRIETORS OF THE
Pottsville Rolling Mills & Pioneer Furnaces
POTTSVILLE, PENNSYLVANIA.
Having introduced New and Improved Machinery into their Rolling Mills, and manufacturing all their
Iron from the ore, and also doing all Machine Work and Repairs in their own shops, they are enabled to
produce**RAILROAD IRON**Of uniform quality, unsurpassed for strength and wear, and of any required length.
Address the Proprietors Pottsville, Pa.**The Britannia Ironworks Company, Limited,**
Middlesbro' England,MANUFACTURERS OF
ALL DESCRIPTIONS OF IRON RAILS
Surplus Stocks of Various Sections always on hand.
London Office: W. G. FOSSICK, 6 Laurence Pountney Hill, E. C.
Weekly Output, One Thousand Tons.**NEW HAVEN
Rolling Mill Comp'y**
Manufacturers of Merchant, Horse Shoe, and extra
quality Iron. Guaranteed to stand specified tests.
Special orders taken for common iron.
New Haven, CONN.
DANIEL L. TOWER,
Malleable & Gray Iron
Castings,
ELIZABETHPORT, N. J.
Malleable Iron Castings, either from Cupola or Air
Furnaces.
N. Y. Office, 20 Cortlandt Street.

Send for Circular.

THE NICHOLSON FILE.

All Nicholson Files are cut with the Patent Increment Cut, an invention owned and controlled exclusively by us, the file cut in this manner being Patented as a new article of manufacture, and differs from all other machine cut files (all of which have their teeth cut with equal spaces) by being cut with teeth slightly expanding or increasing in size and space from the point, thus avoiding the too great regularity of teeth common to all other machine cut files. The tendency of all cutting tools with teeth or cutters placed at regular distances from each other may be illustrated (to the machinist at least) by the fluted reamer—as it is well known that if a round reamer be made with (say 12) teeth whose spaces are equidistant, the hole reamed will not be round and smooth, but will approximate to a hexagon in shape. Whereas, if the same number of teeth be made of irregular distances, the hole reamed will be both round and smooth. The same is true of a file, hence the necessity of its having teeth at unequal distances, and to which we have applied the name of Increment Cut File, which possesses all the advantages of hand cut work, and the accuracy and uniformity of machine work. It is now upwards of seven years since this File was introduced to the public, and the demand has increased until our production is undoubtedly treble that of any File manufactory in the country.

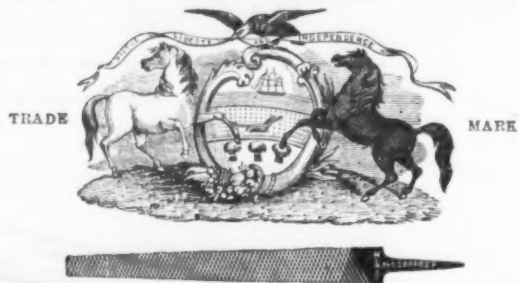
We put all files under seven inches in boxes of either one-half or one dozen each. These boxes are neatly arranged, and open on the end, on which the kind is plainly marked with printed labels, acknowledged improvements on the old methods.

The "Increment File" is not an experiment, but an established fact, and already has acquired a legitimate demand for upwards of 500 dozen per day. We employ no regular Travelers, but our goods may now be found in the hands of the principal jobbers and dealers throughout the country.

Prices and terms will be forwarded on application to

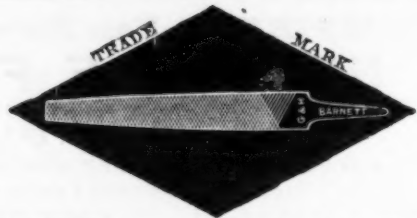
NICHOLSON FILE COMPANY,
Providence, R. I.

PENNSYLVANIA FILE WORKS.



McCAFFREY & BROTHER,
Manufacturers of FIRST QUALITY FILES and RASPS ONLY,
Nos. 1732 & 1734 North Fourth Street, Philadelphia, Pa.

Black Diamond File Works.



G. & H. BARNETT, 39 41 & 43 Richmond St. Phila.

1816. 1844. 1850. 1868.
H. F. F. H. F. F. & SON. P. A. F. P. A. F. & CO

PETER A. FRASSE & CO.,
95 Fulton Street, New York,
IMPORTERS OF

Stubs' Steel Wire, Files and Tools,
Grobet Swiss Files,
Extra Quality English Spring Steel Wire,
Nos. 1 to 34.

Steel Wire for Sewing Machine Needles and for other Purposes,
French Cold Rolled Sheet Steel,
Sizes, 22 to 36 Gauge.

Jewelers', Engravers' & Mechanics' Tools.

The only Agents in the United States for
HUBERT'S CELEBRATED FRENCH EMERY PAPER.
For Lathers' and Machinists' Use.

TURNER, SEYMOUR & JUDDS.

MANUFACTURERS, IMPORTERS AND DEALERS IN

Hardware and Upholsterers' Brass Goods.

SOLE AGENTS FOR

L. L. Davis' Patent Levels, Stevens' Calipers and Dividers,
Page's Auxiliary Jaws.

Manufacturers of Judds', Prindle's and Combination Patent Curtain Fixtures, Locks and Curtis' Patent
Raising Sander, Patent Twine Boxes, Picture Nails and Hooks, Escutcheon Pins, Coat and Hat Hooks; also
Miscellaneous Iron and Brass Goods.

Small Brass and Iron Castings made to order.
64 Duane Street, NEW YORK.

FERNALD & SISE,

HAVE REMOVED TO

No. 100 Chambers St., N. Y.



WHITNEY MFG. CO.
162 and 164 West 27th St., NEW YORK.
Manufacturers of

REAL BRONZE
Door Knobs,
ORNAMENTAL BRONZE FRONT
MORTISE LOCKS

Sash Fasteners, Bell Pulls
Shutter Knobs,
FAST AND LOOSE JOINT
ORNAMENTAL BUTTS.
Catalogues sent on application.
Hart, Eliven & Mead Mfg. Co.,
General Agents for New York.

WILLIAMS WHITE & CHURCHILL,
Successors to
MACKRELL & RICHARDSON MFG. COMPANY,
Manufacturers of

Builders' Hardware,
Locks, Hinges, Hooks and Staples,
Awning Hooks, Meat Hooks, Pincers,
Champion Noiseless Pulleys,
CHAIN PULLEYS, &c.
Factory, cor. Flushing and Nostrand Avenues,
BROOKLYN.
Warehouse, 73 Warren St., N. Y.

FILES.

LIMET & CO'S
Celebrated

French Files.

A large stock and good assortment on hand. Orders
solicited from store and for importation

HOMER FOOT & CO.,

Springfield, Mass.,

SOLE AGENTS

FOR THE UNITED STATES.



Putnam's Government Standard
FORGED

HORSE SHOE NAILS.

Manufactured from the best of NORWAY Iron,
and warranted to give entire satisfaction.

S. S. PUTNAM & CO.,
NEPONSET, MASS.

LANE, GALE & CO

SOLE AGENTS

FOR

TROY WRO'T BUTT CO'S Wrought Iron Butts (Riveted Pin).

THE EAGLE SQUARE CO'S Steel and Iron Squares.

E. F. HURD'S AXES, HATCHETS, ADZES, &c., &c.

G. T. LANE'S PLANTERS' HOES.

AGENTS FOR

BURDEN'S HORSE and MULE SHOES.

E. W. GILMORE'S STRAP and T HINGES.

SCOVIL MFG. CO'S BRASS BUTTS.

J. M. KING'S STOCKS & DIES.

McCREA'S SHOE THREADS and TWINES.

G. F. ELLS' CURRY, CATTLE and PLANTATION CARDS

ENAMELED and TIN WARE, &c., &c., &c.

TROY. N. Y.

G. W. Bradley's Edge Tools.

Butchers' Cleavers,
Bush Hooks, all patterns,
Farpointe Tools, all kinds,
Coopers' Tools, a specialty,
Ship Carpenters' Tools,

Axes and Hatchets,
Grub, Garden & Planters' Hoes,
Mill Picks, Mattocks & Picks
Box Scrapers & Chisels,
Cotton Hooks & Samplers.

N. WEED. 37 Chambers St.

JAMES C. HAND & CO.,

COMMISSION MERCHANTS,

No. 614 & 616 Market Street,

PHILADELPHIA.

AGENTS FOR:

William Penn, Reading and Norristown Pig Iron.
Reading Iron Co.'s (Crescent Brand) Nails, Boiler Flues &c.
Bar Iron, Plow Steel and Iron, South Easton Iron Wire.
Wm. Jessop & Sons' Steel and Norway Nail Rods.
Barrows, Savery & Co.'s Hollow Ware Castings, &c.
Fisher & Norris' "Eagle" Anvils and Vises.
Washington Mills Emery.
Heavy Hardware, &c., &c.

WELLS W. LEGGETT.

LEVERETT L. LEGGETT.

LEGGETT & LEGGETT,

Patent Attorneys and Solicitors of Patents.

WASHINGTON, D. C.

Give special attention to securing American and Foreign Patents for Inventors,
Reissues and Extensions of Patents; also, to the taking up and prosecu-
ting of Rejected Cases, Interferences, Infringements, Appeals, etc

We prosecute cases before the Patent Office & in the different Courts.

Correspondence promptly and carefully attended to.

W. F. SHATTUCK & CO.,

113 Chambers and 95 Reade Street, New York.

MANUFACTURERS OF AMERICAN HARDWARE.

Cox & Taft's Pat. Wrenches. House Traps. Wire Seives. Yaw's Cow Bells.
Axe, Pick, Sledge & Hammer. Scale Beams. Axes, Picks and Hatchets.
Handles. Patent Tap Borers. Hammers. Crow Bars.
Hatchet, Auger, Chisel & File. Tool Chests. Sled Irons.
Handles. Climax Horse Collars. Boring Machines.
Mallets. Pat. Boot Jacks. Brundage Horse Nails. Cast Iron Hatchets.
Gimlets and Gimlet Bits. Maguire's Wrt Iron Goods. Coffee Mills.
Augers and Auger Bits. Shattuck's Platform Counter. Star Steel Spoons.
Cocon Nut Dippers. Scales. Stocks and Dies.



E. C. MERRILL, West Charleston, Vt.
Patentee and Manufacturer of the **Cosmopolitan Solid Emery Wheels.**
Saw Gummets, Artificial Stone for Building and Ornamental Purposes,
Diamond Turning Tools, Emery Wheel Machinery, &c.

OFFICES: Boston, 114 & 116 Elliot Street. R. R. Wheeler, Agent
New York, 91 Liberty St.
A complete assortment of sizes, grades, &c., constantly on hand. The **Cosmopolitan Emery Wheels** have taken the Highest Awards at every Fair where they have been exhibited, viz.: N. Y. Institute, 1872; New England Agricultural and Mechanical Fairs, held at Lowell, Mass., and the Vermont State Fair for the past two years.
Send for Prices. A liberal discount made to the trade.

OTIS FURNACES & MINES.

New Union Steam Safety Elevator,

How One Works.

RIVERSIDE IRON WORKS, DEWEY, VANCE & CO.,
Wheeling, W. Va., January 14th, 1873.

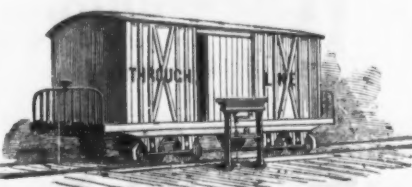
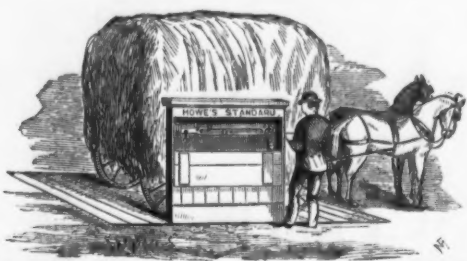
Messrs. OTIS BROTHERS & CO., New York.

Dear Sirs: The experience of a year proves that your **Furnace Elevator** is superior to all others in use. We have in the six weeks from December 1st to Sunday last, 12th inst., made 2724 tons, 1401 lbs. Pig Metal, or an average of near 65 tons per day, which required the elevator to lift 72 feet high 4 1/2 tons Ore, Coke and Limestone for each ton of metal produced, or more than 11,500 tons material in the 6 weeks. The largest yield in one day was 811-1-4 tons Iron, involving the lifting of 345 tons material in 24 hours. This has all been done to our satisfaction, and that, too, in the coldest weather we have had. Other furnaces with water and pneumatic hoists have experienced great difficulty, on account of the water freezing in the tanks; and in the case of the air hoists, we understand that two furnaces, not far from us, had to "blow out," from being unable to hoist stock during the "cold snap." The difficulty, we are told, was caused by the condensed moisture in the blast freezing to the sides of the cylinders, so that the piston could not move up or down. Very truly, yours,
DEWEY, VANCE & CO.

Send for Circular to

OTIS BROTHERS & CO.,

348 Broadway, NEW YORK.



HOWE'S STANDARD SCALES. SAMPSON STANDARD SCALES.

Weighmasters' Beams and Frames. Trucks of all varieties.

All descriptions and sizes of these articles are made by the

Brandon Mfg. Company, at Brandon, Vt.

And sold by their Agents in all the leading cities and towns of the country.

The Scales made by this Company possess valuable patented improvements over all others. They have taken more first-class Premiums than all others during the past ten years. The Brandon Manufacturing Company guarantee all goods made by them to prove satisfactory and superior to any other make.

Call and examine their goods, or send for Circulars and Price Lists to

The BRANDON MANUFACTURING CO., BRANDON, VT.

Or their Warehouses and at the following places:

AGENTS.

PAGE & CO., 3 Park Place, New York.

E. H. SOUDER, 1021 Market St., Philadelphia, Pa.

W. A. McCLURG, 63 Wood St., Pittsburgh, Pa.

SPEAR BROS., 21 S. Charles St., Baltimore, Md.

WM. M. BIRD & CO., Charleston, S. C., and Savannah, Ga.

FOLGER & COMPANY, 37 & 39 Magazine St., New Orleans, La.

BRANDON SCALE CO., 53 Sudbury St., Boston.

W. A. DOBSON & CO., 86 Main St., Buffalo, N. Y.

HEART & CO., 181 River St., Troy, N. Y.

AGENTS.

LYMAN, DORNEY & CO., 116 Main St., Cincinnati, O.

A. M. GILBERT & CO., 38 State St., Chicago, Ill.

BUHL, DUCHARME & CO., Detroit, Mich.

ARNOLD & YALE, Milwaukee, Wis.

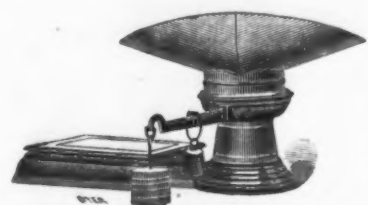
KINGMAN & CO., Peoria, Ill.

JOHN T. EDGAR, Omaha, Neb.

GILBERT WEEKS & CO., St. Louis, Mo.

V. S. W. PARKHURST, 318 Pine St., San Francisco.

EVANS & SON, 14 St. John St., Montreal, C. E.



With one Square and one Round Platform.

Grindstones, Emery, &c.



J. McDERMOTT & CO

MINERS AND MANUFACTURERS OF

GRINDSTONES.

Black River, Independence and Berea Grits.

BUILDING STONES

of every description, from the above quarries.

OFFICE, National Bank Buildings,

Cor. Superior and Water Sts., CLEVELAND,

WALTER R. WOOD,

Manufacturer of and Dealer in American

and Foreign

GRINDSTONES

AND OHIO BUILDING STONE.

TRADE MARK.

THE UNION STONE CO

Patentees and Manufacturers of

Emery Wheels,

Oil Stones, and Emery

Blocks.

To order, in size and form to suit various mechanical

uses. Grinders, Saw Gummings, Diamond

Tools, and Wood Patent Knife Grinders for

Planing, Paper Cutting, Tobacco, Leather-Splitting and

other Long Kives. Also, Mill Stone Cement.

16 Exchange Street, BOSTON, MASS.

Branch Offices, 136 Liberty Street, NEW YORK.

Send for Circular.

THE STANDARD MAKE!

Emery Wheels and Emery Grinding Machinery.

THE T-NITE CO., Stroudsburg, Pa.

Cranston Savings Bank,

IN PROVIDENCE, R. I.

No. 47 Westminster St.,

(Atlantic Building) cor. Exchange St.

Interest allowed from the first of EVERY MONTH.

Deposits made on or before the 15th will draw interest

from the 1st. Dividends payable 10th of March

and September.

AMASA SPRAGUE, Pres. A. B. DIKE, V. Pres.

DIRECTORS.

WILLIAM SPRAGUE, ALBERT DAILEY,

GEORGE B. HOLMES,

ALBERT S. GALLUP, THOMAS A. DOYLE.

JOSHUA WILBOUR, Secy. and Treas.

HORATIO A. HUNT, Asst. Treas.

Open Saturday Evenings from 6 to 8 o'clock for Deposits

only. Dividends since organization has been 5 per

cent. per annum.

TACKLE BLOCKS.

BURR & CO.

Manufacturers of Waterman and Russell's

PATENT IRON STRAPPED BLOCKS.

ALSO, MANUFACTURERS OF

ROPE STRAPPED BLOCKS,

31 PRATT SLIP NEW YORK.

PATENT FLOOR & DOOR CLAMP.

Patent Hose Shield,

and 8 Sizes Hatchets.

J. A. HAASE, near 116 Vanhorn St.

(East of 1073 Germantown Ave.), Philadelphia, Pa.

Send for Circular.

William N. Jennings,

FINE PRINTING & STATIONERY,

No. 43 Franklin Street,

bet. Broadway & Elm St.,

NEW YORK.

RIEHL BROTHERS,

Ninth Street, near Coates, Philadelphia.

New York Store, 93 Liberty Street,

Pittsburgh Store, 73 Water Street.



SCALES

PHILADELPHIA

ESTABLISHED 1848

"The Celebrated Stock House Scale,"

New Style Testing Machines, all sizes,

Brought Iron Lever R. R. Track Scales,

Parallel Crane Beams and Mortising

Machines.

H. CARTER & SON,

290 PEARL ST., NEW YORK.

Moulders' and Plasterers' Tools.

Manufacturers of and Dealers in all Descriptions of

Moulders' and Plasterers' Tools, and Dealers in

General Hardware, Gilded Copper Weather Vanes,

CARTERS' PATENT CARRIAGE LIFTING JACK, &c.

HOWSONS'

OFFICES FOR PROCURING

UNITED STATES AND FOREIGN

PATENTS,

Forrest Buildings

119 SOUTH FOURTH ST., PHILADELPHIA.

AND MARBLE BUILDINGS

605 Seventh St. (Opposite U. S. Patent Office,

Washington, D. C.)

H. HOWSON, Solicitor of Patents.

C. HOWSON, Attorney Law

Communications should be addressed to the

PRINCIPAL OFFICES PHILADELPHIA.

JAMES A. WHITNEY, Patent Agent

and Expert, offers his services to inventors in

securing American and Foreign Patents, as ex-

pert in patent cases, etc.

"We take pleasure in recommending the new agency

to the favor of inventors." *The Iron Age*, June 6.

"Of Prof. James A. Whitney we can speak from a

personal acquaintance. Any person seeking profes-

sional advice from him will be certain of just a d hon-

orable treatment." *Norwich Conn., Daily Advertiser*

May 29.

"His long experience in this field of investigation

has made him familiar with the business in all its

branches, and we can confidently recommend him to

those needing his services." *Prairie Farmer*, Chicago,

June 1.

"Few persons have had more opportunities for

learning the necessities of such a business." *The World*

(weekly), New York City, June 19.

"A thorough, mechanical engineer with a valuable

practical experience in the machine shop." *Am Rail-*

way Times, Boston, June 5.

"Mr. Whitney is qualified by experience and prac-

tical knowledge. His life and experience have been

such as to develop the fullest sympathy with men

engaged in industrial pursuits, especially y inventors."

Moore's Rural New Yorker, June 5.

Address, for full information, free of charge,

125 Broadway, Room 11, New York City.

Over 50,000 Sold.

BAILEY'S PATENT

Adjustable Planes.

Manufactured by the

Stanley Rule & Level Co.,

NEW BRITAIN, CONN.

Sold by all Hardware Dealers.

Warehouse, 55 Chambers St., New York.

FAIRBANKS' SCALES,

MANUFACTURED BY

E. & T. FAIRBANKS & CO.

Factory Established 1830,

and these Standard Scales still manufactured only by the

original inventors.

R. R. TRACK, HAY, COAL SCALES.

COAL DEALER

SCALES

For Rolling Mills, Furnaces, Foundries,

Miners' Use.

SCALES

For Stores, Mills and Wharves.

SCALES

FOR ELEVATORS & GRAIN WAREHOUSES

SCALES

For Farmers, Butchers, Druggists, &c.

CAUTION.

The well earned reputation of our scales has induced

the makers of imperfect and worthless balances to offer

them as "Fairbanks' Scales," and purchasers have there-

by, in many instances, been subjected to fraud and im-

position.

If such makers were capable of constructing good

Scales they would have no occasion to borrow our name.

BUY ONLY THE GENUINE

Fairbanks' Standard Scales.

MANUFACTURED BY

E. & T. FAIRBANKS & CO.,

ST. JOHNSBURY, VT.

Principal Scale Warehouses,

FAIRBANKS & CO., 311 Broadway, New York.

FAIRBANKS & CO., 166 Baltimore St., Baltimore, Md.

FAIRBANKS & CO., 58 Camp Street, New Orleans.

FAIRBANKS & CO., 30 Main Street, Buffalo, N. Y.

FAIRBANKS & CO., 334 Broadway, Albany, N. Y.

FAIRBANKS & CO., 423 St. Paul Street, Montreal.

FAIRBANKS & CO., 34 King William St., London, Eng.

FAIRBANKS, BROWN & CO., 2 Milk St., Boston, Mass.

FAIRBANKS & E. WING, Masonic Hall, Philadelphia, Pa.

FAIRBANKS, MORSE & CO., 111 & 113 Lake St., Chicago.

FAIRBANKS, MORSE & CO., 129 Walnut St., Cincinnati, O.

FAIRBANKS, MORSE & CO., 182 Superior St., Cleveland, O.

FAIRBANKS, MORSE & CO., 18 Wood St., Pittsburgh.

FAIRBANKS, MORSE & CO., 5th & Main Streets, Louis-

ville, Ky.

FAIRBANKS & CO., 372 & 374 Washington Ave., St. Louis.

FAIRBANKS & HUTCHINSON, San Francisco, Cal.

Over 200 Gauntlets and 60 Port-

able Pyrometers are now in use at

Blast Furnaces.

Circulars on application.

Edw. BROWN,

311 Walnut St., Philadelphia.

ALSO FOR SALE

PYROMETERS

For Baker's Ovens, Boiler Flues,

Galvanizing Baths, Oil Stills, Vul-

cianizers, Superheated Steam.

E. Brown's Portable Blast Gauge

for the plug hole, Steam Gauges,

Blast Gauges, Mercury Gauges,

Recording Steam Gauges, Engine

Counters, Indicators for ascertain-

ing the Horse Power.

Cowdin Mfg. Co.,

Manufacturers of the

DIAMOND

FLINT AND EMERY

PAPER,

Flint & Emery Cloth.

113 Chambers Street,

P. O. Box 3502. NEW YORK CITY.

Geo. W. Prentiss & Co.,

HOLYOKE, MASS.,

MANUFACTURERS OF

IRON WIRE,

Bright, Coppered, Annealed and Tin

Plated.

Coppered Rail, Ball Wire, Bolt Screw, Rivet, Belt

Hook and Buckle Wire; Wire for the manufacture

of Pins, Hair Pins, Wire Cloth, Heddles, Reeds, &c.

Also, Clock, Machinery, Spiral Spring and Piano

Pin Wire, Plated Piano String Covering Wire, Plated

Hook and Eye and Button Eye Wire, Tinned Broom

Wire, fine Tinned Wire, and Tin-Plated Wire of all

HENRY DISSTON & SONS'

SAW, TOOL, STEEL AND FILE WORKS,

Front and Laurel Streets,

PHILADELPHIA, PA.

Hankins' Elliptic Forked Saw Frame.



The annexed engraving represents HANKINS' ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Frame being all in one piece, without any centre bolt, secures for the Frame great strength and durability. These Frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."

HARVEY W. PEACE
VULCAN SAW WORKS,
WILLIAMSBURG, N. Y.

AMERICAN SAW CO.,
No. 1 FERRY STREET, NEW YORK.

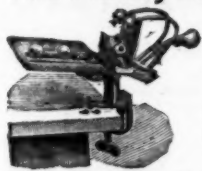


Solid saws require frequent gumming, thereby subjecting them to risk of springing or breaking. This is especially the case with cross cuts having Patent Teeth. In the perforated saws all gumming is avoided, and the teeth are easily kept long and in proper shape, saving files, labor, expense and vexation. As is well known, our saws cut faster, smoother and easier than any other.

MOVABLE-TOOTHED CIRCULAR SAWS AND SOLID SAWS OF ALL KINDS.



The Family Cherry Stoner,



The only really practical cherry stoner ever made. It does its work perfectly, without mashing the fruit.

D. H. GOODELL, Sole Manufacturer
Office & Salesroom, 55 Chambers St., N. Y.
Works at Antrim, N. H.
Also sole manufacturer of Turn Table and Lightning Apple Parers, Lightning Peach Parers and Climax Apple Corers.



WM. ESTERBROOK,
Wholesale Manufacturer of
Coal Hods, Fire Shovels, etc.,
311 Cherry St., PHILADELPHIA.

E. R. & G. A. HART,
Old and New Rails, Muck Bars,
PIG AND SCRAP IRON,
COPPER, &c.
No. 208 Walnut St., Philadelphia.
SECOND FLOOR.

Clement & Hawkes Mfg. Co.,
Manufacturers of
SHOVELS,
Planters' Hoes, Trowels and Machinery,
Northampton, Mass.
Send for Circular and Price List.



H. W. PEACE,
MANUFACTURER OF
SAWS OF ALL KINDS.

FACTORY, WILLIAMSBURG, N. Y.

Excelsior Saw Works,

515 Cherry St., Philadelphia.

WM. McNIECE,

Manufacturer of

Superior Cast Steel Hand, Panel, Ripping, Ice, Compass, Hack, Butchers' Bow, Grafting, Pruning, Keyhole and Web Saws, Mowing Knives, Trunk Springs, And all other kinds of Springs, made from Sheet Cast Steel.

E. C. ATKINS & CO.,
Indianapolis, Indiana,

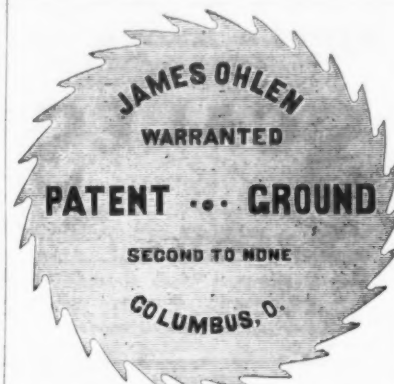
Saw Manufacturers.

Best Cast Steel Patent Ground Saws.
Also, sole Manufacturers of Atkins' Patent



CROSS-CUT SAW HANDLE.

Best Patent Handle in use.
Manufacture and Office—Nos. 210, 212, 214 and 216 South Illinois Street.



I make a specialty of the LARGEST SIZES of Circular Saws, and call particular attention of lumber manufacturers to the following points of excellence: **Evenness of Temper.**—The peculiar structure of my furnace subjects all parts of the saw to a DEAD heat, and when dipped in the oil bath secures perfect uniformity. **Perfect Accuracy in Thickness.**—My saws are ground on a patent machine, automatic in its operation, grinding off the thick places upon the plate before the thinner parts are reached, and when the saw is removed BALANCES PERFECTLY, which is proof positive of the right accomplishment of the work.

Properly Hammered.—Great care is taken that no saw shall leave my works without due attention in this important particular. A saw too tightly strained upon the rim, or too loose in the center, cannot be successfully run—hence the importance of so hammering the saw as to effect equal strain in all its parts, and at the same time RUN TRUE. This department is under the personal supervision of myself, who has devoted over twenty years to the art of saw making.

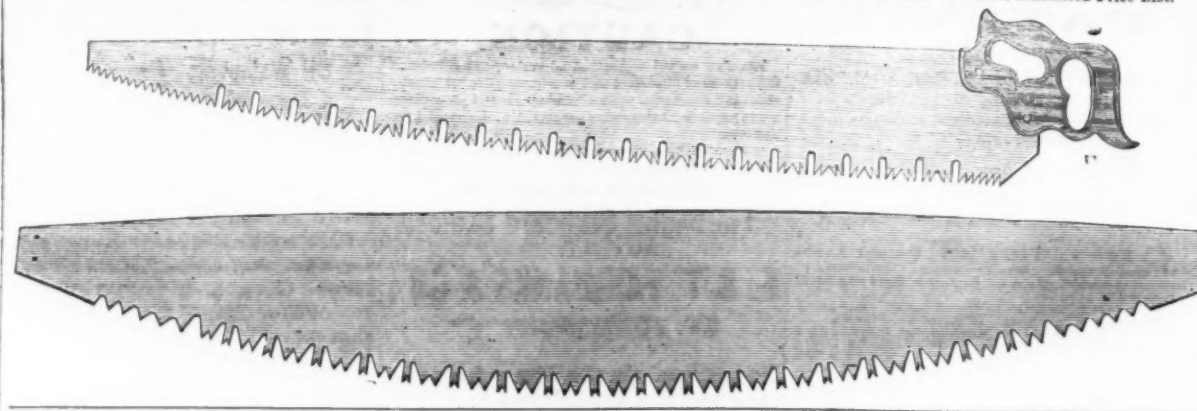
I am sole proprietor and manufacturer of the celebrated "Challenge" Cross-Cut Saw. Price Lists of all kinds of saws sent on application.

JAMES OHLEN.

WORRALL & CO.,
MANUFACTURERS OF
EXTRA CAST STEEL SAWS,
Plastering Trowels, Tools, &c.

Saw Manufactory, Iron Foundry & Machine Shops, ELIZABETHPORT, N. J.
Office and Warerooms, 28 Elm Street, New York.

J. FLINT & CO.,
Manufacturers of all kinds of SAWS and PLASTERING TROWELS, Rochester, N. Y.
A large Stock of Cross Cut Saws constantly on hand. Orders filled promptly. Dietrich's Double Handle One Man Cross Cut Saw made with any kind of tooth desired. Our patent method of grinding Hand Saws makes them superior to any in the market. Send for illustrated Price List.



W. ROSE & BROTHERS
WEST PHILADELPHIA,
Manufacturers of

Plasterers' and Brick Trowels,

Hammers and Chisels.

Also,
Saddlers' Round Knives, etc.,
N. E. cor. 36th & Filbert Sts.
Please send for Price List.

F. G. HOLTON & CO.,
Manufacturers' Agents,
and dealers in
HARDWARE SPECIALTIES.
Special attention given to the introduction of
NEW ARTICLES OF HARDWARE.
No. 101 Main Street, Cincinnati, Ohio.

NEW YORK SCREW BOLT WORKS.

(Estate of R. J. DEWHURST, deceased.)

JOHN COCHRANE, Executive Agent and Manager,
Office and Works, cor. Ave. D and 11th St., N. Y.

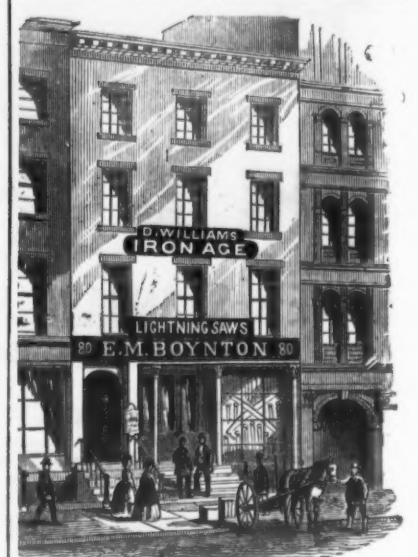
Bolts, Nuts, Turnbuckles, Washers, Forgings, &c.
The attention of large consumers solicited.

COFFIN TRIMMINGS,

MANUFACTURED BY

WAYNE HARDWARE CO.,

124 Main Street, CINCINNATI, O.

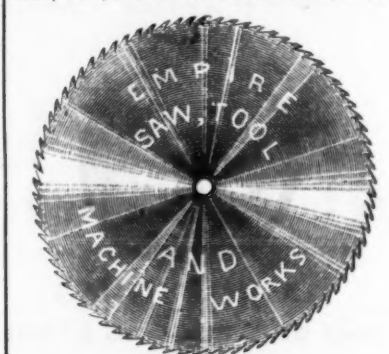


BOYNTON'S LIGHTNING SAWS.
Awarded the Medal of the American Institute, 1872.



A Challenge of \$500, toward expense of a public test, to prove that the Lightning Saws excel all others in Speed, Ease, and Simplicity, has been offered since 1870, and has never been accepted. More than 100,000 Lightning Saws were sold during the year 1872, the purchasers of which testify to their superior merits. Our leading papers, such as the Tribune, American Agriculturist, Christian Union, etc., have published over sixty editorial notices recommending these Saws. Farmers' Clubs, Lumbermen, and Hardware Dealers unite in pronouncing the genuine Lightning Saw the greatest labor-saving implement of the age. I have hundreds of letters from practical sawyers, voluntarily written, expressing their entire approval of these Saws. Where the Hardware Trade do not sell the Lightning Saw, I will send a 6-foot cross-cut and a buck saw-blade on receipt of \$5. For Catalogues and additional information, address: E. M. BOYNTON, 80 Beekman St., New York, Sole Proprietor and Manufacturer.

JAMES ECCLES, ENGINEER
and General Machine Maker,
2423, 2425, 2427 Lombard St., Philadelphia, Pa.



MANUFACTURER OF
SAWS OF ALL KINDS.
Saw Grinding Machinery
Of the most approved make, on hand and for sale; warranted to grind either straight or to any given taper or bevel. Sole maker of the **Quadruple Screw Power Press.** General Machine Work executed to order.

WHEELER, MADDEN & CLEMSON,
Manufacturers of Warranted Cast Steel

SAWS

of every description,
including
Circular, Shingle, Cross Cut,
Mill, Hand, Roberts' and
other Wood Saws,

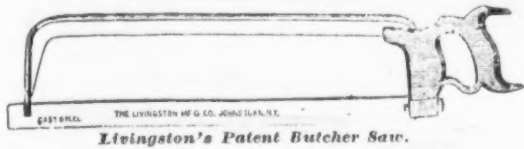
&c., &c
Cast Steel Files

of the well known brand of
Wheeler, Madden & Clemson.
FACTORIES:
Middletown, Orange Co., N. Y.

BRANCH OFFICE:
97 Chambers Street, New York.
BRUNDAGE FORGED HORSE NAILS,
Manufactured from
BEST NORWAY IRON,
by BRUNDAGE & CO. Sold by
WHEELER, MADDEN & CLEMSON
Middletown, Orange Co., N. Y.

T. F. CHERITREE & CO., HARDWARE,

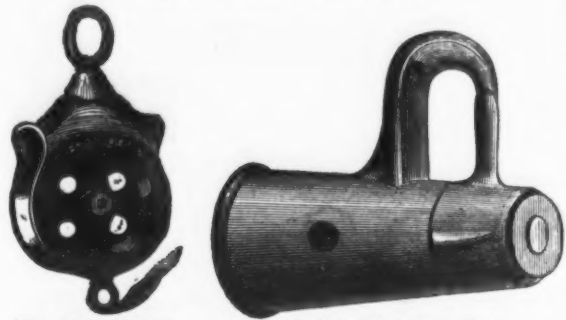
95 Reade and 113 Chambers Street, New York.



Livingston's Patent Butcher Saw.

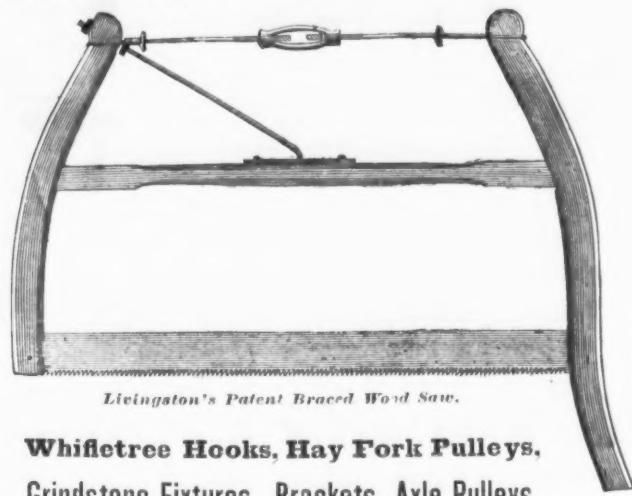


Livingston's Patent Kitchen Saw.



Hay Fork Pulley.

Patent Whiffletree Hook.



Livingston's Patent Braided Wood Saw.

Whiffletree Hooks, Hay Fork Pulleys,
Grindstone Fixtures, Brackets, Axle Pulleys,
ACORN BUTTS, BARN DOOR HANGERS, &c.

LIVINGSTON'S PATENT SAWS.

Send for Price List.

Cutlery.

Landers, Frary & Clark,
New Britain, Conn.,
MANUFACTURERS OF
TABLE CUTLERY
OF EVERY DESCRIPTION, ALSO.

General Hardware,
IN VERY GREAT VARIETY.

298 BROADWAY, N. Y.

HENRY DICKINSON,
Sheffield Cutlery, Files, &c.,

66 & 68 READE STREET (near Broadway), NEW YORK

Manufacture, SHEFFIELD, ENGLAND.

Isaac Milner's Fine Pocket and Table Cutlery.
Howard Bro.'s Medium Pocket Cutlery.
J. B. Osberton & Co.'s Medium Table Cutlery.
Isaac Milner's Razors, Butcher and Hunting Knives.
Hargreaves, Smith & Co.'s "Imperial" Files.
Milner's " " and Collins' "IXL" Hand Saws.

ROWE & POST,
MANUFACTURERS OF

Shears, Trimmers, Scissors, &c.
No. 120 Chambers and 50 Warren Streets,
NEW YORK.

TRADE MARK.
J. Rowe's XL.TRADE MARK.
Etna Shear Co.

Send for Catalogue.

JOSEPH S. FISHER,

No. 411 Commerce St. PHILADELPHIA,

AGENT FOR

George Wostenholm & Son,
Washington Works, SHEFFIELD,
Celebrated I-XL Cutlery, Razors, &c.

SOLE AGENT FOR THE UNITED STATES OF
WALTER SPENCER & CO.,
Steel and File Manufacturers,
Rotherham, ENGLAND.

Corporate Mark.

N^o SPENCER
ROTHERHAM

Granted 1777



Nixon & Winterbottom,
PYRAMID WORKS, Sheffield, Eng.

Manufacturers of Table Cutlery, Butcher Knives,
Bread Knives, &c., by patent and Improved Ma-
chinery. Agents: U. S. Smith & Hall, 58 & 60 Reade
St., N. Y.; Canada, Thos. Ellis & Co., Sheffield, Eng.

RICHARD A. TURNOR

37 Chambers St., New York,

Agent for

F. W. HARROLD,
Hardware Commission Merchant,
BIRMINGHAM.

JOSEPH ELLIOT & SONS,
Manufacturers of Razors, Table Knives, &c.,
SHEFFIELD.

CORPORATE MARK.

**Joseph Rodgers & Sons'**

(LIMITED)

CELEBRATED CUTLERY,
No. 82 Chambers Street, New York.
CHARLES PEACE, Jr., Agent.

The demand for Joseph Rodgers & Sons' productions having considerably increased they have, in order to meet it, greatly extended their Manufacturing Premises and Steam Power. To distinguish Articles of Joseph Rodgers & Sons' Manufacture, please to see that they bear their Corporate Mark.

ESTABLISHED 1852.

NEW YORK KNIFE CO.

MANUFACTURERS OF SUPERIOR

Table & Pocket Cutlery,

WARRANTED TO BE MADE OF THE BEST MATERIAL.

WALKILL RIVER WORKS.

Walden, Orange Co., New York.

THOS. J. BRADLEY, President.

The Miller Bros. Cutlery Company,

Manufacturers of Patent

FINE PEN AND POCKET CUTLERY,

WEST MERIDEN, CONN.

We warrant our Knives equal in cutting quality and workmanship to any made. We also make SILVER PLATED POCKET KNIVES, which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal to any other Knife.

CLARK, WILSON & CO., Agents,
81 Beekman Street NEW YORK.

Cutlery.

**WALSH, COULTER & FLAGLER,**

83 Chambers and 65 Reade Sts., New York,

AMERICAN AND FOREIGN

HARDWARE,

SOLE AGENTS FOR THE SALE OF

JOHN ROTHERY'S
CELEBRATED FILES.

Walden Co-operative Knife Co.
SUPERIOR POCKET CUTLERY.

Thomas Taylor,

43 Chambers Street, New York.

Agent for

HENRY H. TAYLOR,
SHEFFIELD CUTLERY,

Graining Combs.
Sole Agency in the U. S.
for
JONATHAN CROOKES & SON'S

Celebrated Pen, Pocket and
Sporting Knives.
Corporate Mark.



AMERICAN KNIFE CO.,
Thomaston, Conn.,

Exclusive Manufacturers of

Steele's Pat.

FOLDING RULE

AND KNIFE.

Also, Manufacturers of

all kinds of

POCKET CUTLERY.

Chicago Agency, 112 State St.

Notice of Removal.
ASLINE WARD,

From 54 Beekman St. to No. 101 and 103

Dunne St., N. Y.

Representing

GEO. WOSTENHOLM & SON
CUTLERY AND RAZORS.

WASHINGTON WORKS, SHEFFIELD.

CORPORATE MARK.



FRED'K WARD & CO., SHEFFIELD,
CUTLERY & TABLE KNIVES.
CORPORATE MARK.

Ford's Pat. Stove for Heating Air for Blast Furnaces

Adopted at 13 different Furnaces.

West Point Foundry,
Cold Spring, N. Y.

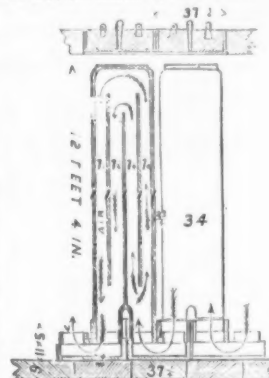
PAULDING, KEMBLE & Co.

30 BROADWAY, NEW YORK, sole Proprietors for the United States.

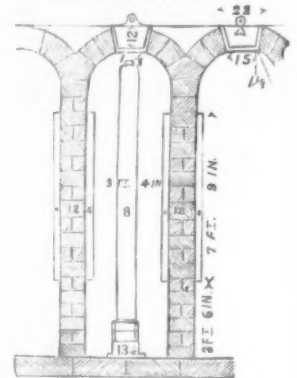
JOSEPH CRAMPTON, Agent,

23 19th Street, Pittsburgh, Pa.

Showing pipes lengthways in one section.



End view of one section.



REFERENCE.

PHILADELPHIA, Nov. 16, 1872.

PAULDING, KEMBLE & CO.:

GENTLEMEN: We have five sections of the "Ford's" Ovens in use since blowing in our new Furnace on the 21st of October. The Ovens have given entire satisfaction; we consider them superior to any Cast Iron Oven in use; they heat the air to a greater degree with much less gas and heat on the brickwork than the Player Ovens; they cost less for construction, and, we believe, will prove more durable, and less expensive to keep in repair. Our main difficulty thus far has been to keep the heat down to 1000 deg.; our average is from 1100 to 1200 deg.

In all cases the Cast Iron Key Boxes to form the arch should be filled in lightly with fire-brick blocks, laid dry and covered with loam, or, better, a cast iron plate, to cover the top, with a ring in it, so as to be easily removed.

We built our ovens in one block, entirely of fire brick; the cost of the brick work entire was about 5000 dollars, say about 1000 for each oven.

We put 4 courses of fire-brick in the bottom, laid on a loose slate rock, laid dry, and well grouted each course with Kaolin grout.

We can recommend the Ford Ovens with great confidence to iron men who wish to construct the best kind of ovens in use in the United States. Yours, truly,

P. S.—Our Furnace is now on her 3d week, making about 28 tons per day good Foundry Iron—15 feet

bosh, 50 feet high.

The Billings & Spencer Co.,
MANUFACTURERS OF

The Billings Patent Solid

SEWING MACHINE SHUTTLE.

ALSO,

The Barwick Pipe Wrench,

And all Descriptions of STEEL and IRON

DROP FORGINGS

For Machine Handles, Lathe Wrenches, Milling Machine Cranks,
Thumb Screws, and parts of Guns, Pistols, Sewing
Machines and Machinery Generally.

We also manufacture, to order,

Cap, Set, Machine and Gun Screws, of Iron, Steel or Brass.

** Price List and "Cut" of Goods manufactured by us sent to any order on request.

BILLINGS & SPENCER CO.,

Lawrence Street, Hartford, Conn.

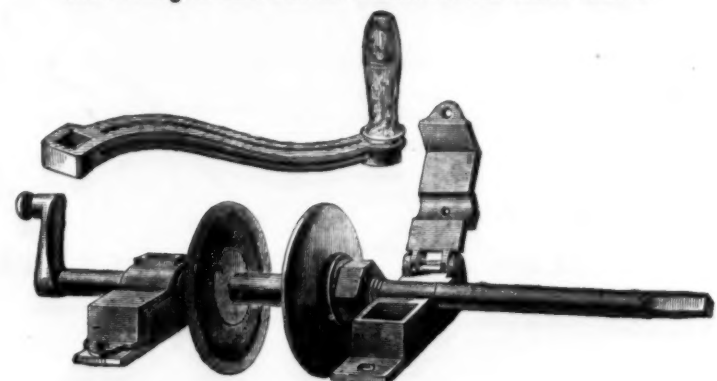
The Hart, Bliven & Mead Mfg. Co.,
18 & 20 Cliff Street, and 243 & 245 Pearl Street, New York.

Factories at KENSINGTON, CONN.

MANUFACTURERS OF

GRINDSTONE FIXTURES,

With Flanges and Patent Babbit Metal Lined Boxes.



The Boxes are covered and rendered entirely free from dirt.
Being Anti-friction they combine all the advantages of the Anti-
friction Rollers, and are cheaper in price.

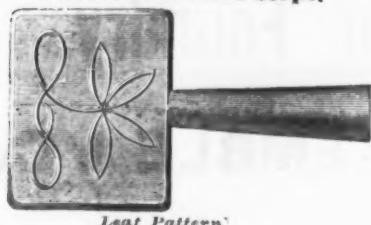
**BUCK BROTHERS, Millbury, Mass.**

Largest Stock and Best Assortment in the United States of
Shank and Socket Firmer Chisels.

Also, BEST QUALITY SOCKET FRAMING CHISELS.

H. D. SMITH & CO., PLANTSVILLE, CONN.

Patent Embossed Steps.



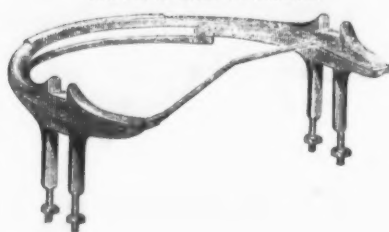
Leaf Pattern.

King Bolt Yokes.

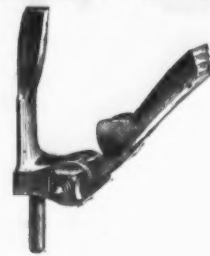


Established 1850.

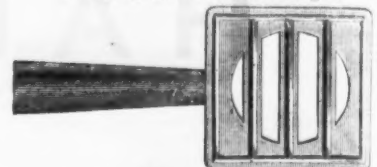
No. 6 Fifth Wheels.



1871 Pattern Shaft Couplings.



Patent Cross Bar Steps.

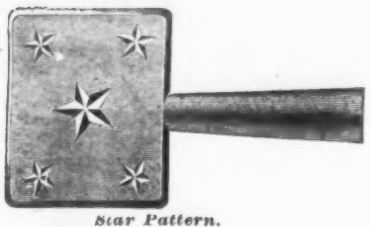
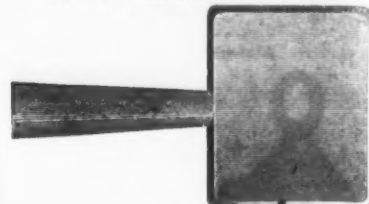


Upper View.



Lower View.

Solid Plain Pattern Steps.



Star Pattern.

Smith's Improved Philadelphia Pattern Slat Irons.



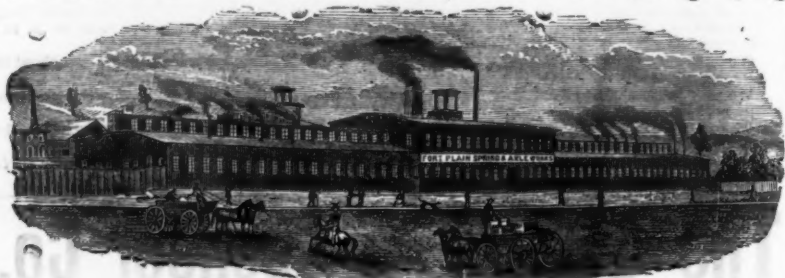
MANUFACTURERS OF A LARGE VARIETY OF FIRST-CLASS

FORGED CARRIAGE IRONS.

Send for Price List.

FORT PLAIN SPRING & AXLE WORKS, CLARK, SMITH & CO.,

Green Jacket Axles. FORT PLAIN, N. Y. Fine Carriage Springs.



MANUFACTURERS OF

English and Swedes Steel Springs, and Iron and Steel Axles.

Execute orders promptly for

Black, Bright, Tempered and Oil Tempered Springs,
Of any Pattern or Style. Also for AXLES of any description, from a COMMON LOOSE
COLLAR to the FINEST OF STEEL.

Our facilities for manufacturing are very extensive, and with our recent additions of new and improved
machinery, we defy competition.

Send for Price List and Descriptive Circular.

CARRIAGE BOLTS.

Buy the Best.

Clark's Patent
Carriage Bolt.

Best Bolt manufactured for all kinds of agricultural machinery. Will not split the wood, and can not
turn in its place.

MANUFACTURED BY

CLARK BROS. & CO., Milldale, Conn.

Also Manufacturers of

Plow and Machine Bolts, Coach Screws, Nuts, Washers, Tire Blanks, Rivets, &c
Send for New Illustrated Price List, just completed.

R. M. GREEN,

100 Chambers Street, NEW YORK.

Hardware Manufacturers' Agent.

REPRESENT:

BATCHELLER MFG. CO., Cast Steel Forks, Rakes, &c.
VERMONT SNATH CO., Snaths.
H. C. COLE, Ox Bows.
NORTH CAROLINA HANDLE CO., Axe and Pick Handles.
EXCELSIOR MFG. CO., Carriage Rims, Hubs and Spokes, Wood Hay Rakes.
VERMONT MFG. CO., Hay, Manure and Shovel Handles. All kinds of Ash, and
Hickory Timber Sawed and Turned to order.

CARRIAGE MATERIALS,

AXLES

Blacksmiths'
Supplies,
Bolts, Woodwork,
TRIMMINGS, &c.
Iron & Steel.
HORSE SHOES

SPRINGS

Manufactured and sold by

GUY C. HOTCHKISS & FIELD

85 First Street, Brooklyn, E. D.

And 527 Hudson St., New York.

H. M. WENTWORTH & CO.,

Manufacturers of

Carriage Axles & Springs,

BEST SWEDEN STEEL,

Sword Tempered, and

Common Patent Tempered SPRINGS

Of every description, made to order.

Dam No. 3, Water St., Gardiner, Me.

Send for Price List.

H. M. Wentworth, F. A. Plalsted.

David Wentworth.

OFFICE AND WORKS,

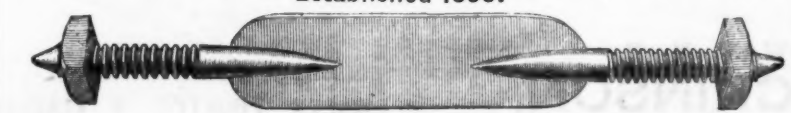


For sale by Machine Agents and Dealers

simonds Mfg. Co., Fitchburg Mass.

Phila. Carriage Bolt Works,

Established 1855.



Hand-made Axle Clip.

Pointed
Tire Bolt.Skelly's New Style Improved
T Head or Shaft Bolt.

T. SKELLY

MANUFACTURER OF FINEST QUALITY OF

NORWAY IRON

CARRIAGE & TIRE BOLTS,

Hand Made Axle Clips,

Skelly's Improved T-Head & Whiffletree Bolts,

Cone, Cheese, Square and Diamond Head

BOLTS,

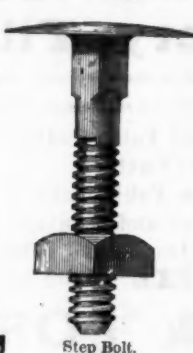
And all the Different Varieties Used by Makers of

Fine Carriages,

TWENTY-FOURTH ST., BELOW CALLOWHILL,

PHILADELPHIA, PA.

EVERY BOLT AND NUT WARRANTED TRUE TO SIZE AND FIT.

Elliptic Head
Perch Bolt.

AUBURN, N. Y.
MANUFACTURERS OF
FORGED NORWAY IRON
Carriage Hardware

HAMES and
Saddlery Hardware.

Leather Belting.

Alexander Brothers,
Manufacturers of OAK TANNED

Leather Belting

412 North 3d, Philadelphia, Pa.

WM. H. STOYLE.

MANUFACTURER OF

Machine Cut Belt Lacing.

No. 403 Library Street,

PHILADELPHIA.

Glass.

A. C. Downing & Comp'y,
Importers of and Dealers in

Window Glass,

FRENCH PICTURE
And Car Glass, etc.
Estimates given by mail.

57 Beekman & 87 Ann Sts
NEW YORK.

Hills, Turner & Harmon,
Importers and dealers

of Brands
FRENCH

Window Glass

193 & 195 State Street,
BOSTON.

THE Philadelphia Star Bolt Works.

Carriage and Tire Bolts,

Axle Clips,

Blank Bolts, &c.



Square Head Bolts,

Wood Screws.

Plow Bolts, &c.

TOWNSEND, WILSON & HUBBARD,

2301 Cherry Street, PHILADELPHIA,

MANUFACTURERS OF THE CELEBRATED

"STAR" Brand of Axle Clips.

and Index to Advertisements.

Agricultural Implements, Manufacturers of. PAGE.
Higginson Mfg. Co., Higginson, Conn. 30
Agricultural Steels, etc., Makers of.
Nellis, A. J. & Co., Pittsburgh, Pa. 28
Applis, Manufacturers of.
Elihu Norris, Trenton, N. J. 31
Augers, Bits, etc., Manufacturers of.
Shattuck W. F. & Co., 113 Chambers, N. Y. 8
Axles, Springs, etc., Manufacturers of.
H. C. Smith & Co., 1211 Centre, Phila. 12
Hutcheson Guy C. & Field, Brooklyn, E. D. 12
Wentworth H. M. & Co., Gardiner, Me. 31
Band Saw Machines, Makers of.
Richman, London, N. Y. 31
Bellows, Manufacturers of.
Churchyard, Joseph, Buffalo, N. Y. 7
Newcomb Bros. Sons, 386 Water, N. Y. 7
Belting, Leather, Makers of.
Alexander Bros., 43 Centre, Phila. 12
Belt Punches, Manufacturers of.
Kelllogg E. C. & Co., Hartford, Conn. 30
Bird Cages, Makers of.
Lindeman D. & Co., Earl, N. Y. 2
Macheline John, 79 Pearl, N. Y. 2
Bit Bricks, Manufacturers of.
Miller's Falls Mfg. Co., 78 Beekman, N. Y. 31
Boilers—Steam.
Brown, Enoch, Bridge and Roof Co., Phila. 31
Mayer L., 99 Mercer, N. Y. 31
Boiler Compound, Makers of.
Mayer L., 99 Mercer, N. Y. 31
Bolt Headin' Machines, Manufacturers of.
Chapin Machine Co., New Hartford, Conn. 1
Plumb, Burdett & Barnard, Buffalo, N. Y. 1
Brass, Manufacturers of.
Ansonia Brass and Copper Co., 19 Cliff, N. Y. 1
Burr, Burrard & Co., Woburn, Mass. 1
Brooklyn Brass and Copper Co., 100 John, N. Y. 1
Coe Brass Mfg. Co., Wobolville, Conn. 1
Farrington & Phillips, 17 Church, Pa. 1
Seavill Mfg. Co., 4 Beekman, N. Y. 1
Wallace & Sons, 89 Chambers, N. Y. 1
Wallace & Sons, 12 McKim, N. Y. 1
Brick Presses, Makers of.
Carroll Eng., 1919 Germantown Ave., Phila. 1
Carroll F. L. & D. L., 1844 Germantown Ave., Phila. 1
Bridge Builders.
Brown, Enoch, Bridge and Roof Co., 5 DeY, N. Y. 1
Bronze Wares, Manufacturers of.
Whitney Mfg. Co., 102 and 104 W. 27th, N. Y. 1
Button Hole Cutters, Makers of.
Goodnow & Wightman, Boston. 9
Batts and Hinges, Makers of.
Eaton, 100 Huntington, Conn. 2
Crooke & Co., 103 Mulberry, N. Y. 2
Ohio Butt Co., 97 Chambers, N. Y. 2
Patterson & Co., 100 Chambers, N. Y. 2
Stanley Works, 38 Beekman, N. Y. 2
Union Mfg. Co., 55 Chambers, N. Y. 2
Cabinet Hardware, Makers of.
Tenders, Ferry & Co., 128 Broadway, N. Y. 1
Carriage Bolts, Makers of.
Skelly T., 213 below Calowhill, Phila. 1
Towsend, Phila. 1
Carriage Hardware, Makers of.
Hayden, Letchworth & Smith, Auburn, N. Y. 1
Smith H. D. & Co., Plantville, Ct. 1
Car Wheels, etc., Manufacturers of.
H. C. Smith & Co., Society, Pa. 1
Taylor Iron Works, High Bridge, N. J. 1
Cash Drawer—Alarm, Manufacturers of.
Tucker & Dorsey, Indianapolis, Ind. 1
Casters, Foundries, Manufacturers of.
John, Hous & Co., Newark, N. J. 1
Chains, Makers of.
Kendrick & Runkle, Trenton, N. J. 1
Wyatt Thos., 71 Eddy, Providence, R. I. 1
Cherry Stoppers, Makers of.
H. B. Woodell, Burlington, N. J. 1
Chisels, Manufacturers of.
Buck Bros., Millbury, Mass. 1
Clothes Wringers, Manufacturers of.
Providence Tool Co., 11 Warren, N. Y. 1
Coaks, Dealers in.
L. S. & Co., 70 Broadway, N. Y. 1
Coal, Miners of.
Fardee A. & Co., 111 Broadway, N. Y. 1
Coal and Iron, Dealers in.
L. S. & Co., 70 Broadway, Providence, R. I. 1
Coal Hooks, Manufacturers of.
Easterbrook Wm., 311 Cherry, Phila. 1
Smith Burns & Co., 45 Cliff, N. Y. 1
Coffee and Spice Mills.
H. B. Brothers, Millbury, N. J. 2
Coffin Trimmings, Makers of.
Wayne Hardware Co., Cincinnati, O. 1
Wilmarth W. D., Attleboro, Mass. 1
Commission Merchants.
Farrington & Phillips, 17 Church, Birmingham, Eng. 3
Compasses and Dividers, Manufacturers of.
Bemis & Call Hardw. & Tool Co., Springfield, Mass. 1
Copper's Tools, etc., Dealers in.
Little Chas. E. & Co., Fulton, N. Y. 1
Corn, Rape, etc.
Allen D. Sons, 136 Front, N. Y. 3
Corrugated Stove Pipe Elbows, Makers of.
Corrugated Metal Co., East Berlin, Conn. 1
E. H. Cook, Chicago, Ill. 1
Cropchises, Manufacturers of.
Newkumet Adam, 1877 N. Front, Phila. 3
Guy Dixon Crucible Co., Jersey City, N. J. 3
H. C. Smith & Co., 1211 Centre, Phila. 3
Taylor, Strow & Co., Phila. 3
Curry Combs, Manufacturers of.
Kelllogg W. F. & Co., Troy, N. Y. 3
Cutlery, Importers of.
Royer Hermann, 101 Duane, N. Y. 3
Bohnstedt-Kind (Solingen), 213 Canal, N. Y. 3
Dickinson Henry, 65 and 62 Reade, N. Y. 3
H. C. Smith & Co., 1211 Centre, Phila. 3
King H. & J. W., 80 Chambers, N. Y. 3
Pease Chas. Jr., 38 Chambers, N. Y. 3
Rosenberg & H. B. Woodell, 100 Chambers, N. Y. 3
Wilson Hawkworth, Ellison & Co., 50 John, N. Y. 3
Smith & Hall, 50 and 10 Reade, N. Y. 3
Thomson & Thomas, 8 Chambers, N. Y. 3
Cutlery, Manufacturers of.
American Knife Co., Thomaston, Conn. 1
Barkinshaw Aaron, Peppercell, Mass. 1
Barnard & Co., 100 Chambers, N. Y. 1
Miller Bros. Cutlery Co., W. Meriden, Conn. 1
New York Knife Co., Walden, N. Y. 1
Van Wart & McCoy, 41 Chambers, N. Y. 1
Differential Pulley Blocks, Makers of.
Van Wart & McCoy, 41 Chambers, N. Y. 1
Dredging, and Makers of Dredging Machines.
Am. Dredging Co., 214 S. Delaware ave., Phila. 1
Drill Chisels, Manufacturers of.
Hubbard & F. Hartford, Conn. 1
Hubbard & Curtis Mfg. Co., 82 Chambers, N. Y. 1
Drills (Hand), Blacksmiths, Makers of.
Morrell & Tibbott, Woburn, N. Y. 1
Drilling Machine, Makers of.
Miller Mfg. Co., 78 Beekman, N. Y. 1
Thorne & Delavan, Philadelphia. 1
Edge Tools, Makers of.
Bradley W. F., 97 Chambers, N. Y. 1
Elevers, Makers of.
Otis Bros. & Co., 338 Broadway, N. Y. 1
Emery Wheels, Makers of.
The Taitte Co., Stroudsburg, Pa. 1
Van Dusen Stone Co., 16 Exchange, Boston. 1
Merrill E. C. W. Charleston, Vt. 1
Enamelled and Plain Hollow Ware, Mfgs. of.
Foxell & Jones, Troy, N. Y. 1
Engineers, Machinists, etc.
Robert James, 1261 Broadway, N. Y. 1
James Moore, cor. 12th and Buttonwood, Phila. 1
Taws & Hartman, 122 N. Front, Phila. 1
Engines, Steam, Makers of.
Hudson River Mfg. Co., Flankhill-on-the-Hudson, N. Y. 1
New York Steam Engine Co., 86 Chambers, N. Y. 1
Robertson Smith, 20 Broadway, N. Y. 1
Whitehill, Smith & Co., Newburgh, N. Y. 1
Wright J. J., 112 Spruce, Phila. 1
York Iron Works, 100 Chambers, N. Y. 1
Engravers, Wood.
Patterson Jas. S., 12 Spruce, N. Y. 1
Roberts Wm., 38 Beekman, N. Y. 1
Roberts W. F., 53 Chambers, N. Y. 1
White H. R., 32 John, N. Y. 1
Eyeglasses.
Anton Eyrelt Co., Providence, R. I. 1
Faucets, Self-Measuring, Makers of.
Faucet Mfg. Co., of Pa., Phila. and N. Y. 1
Files, Importers of.
Carr J. & Riley, 82 John, N. Y. 1
Dickinson Henry, 65 and 62 Reade, N. Y. 1
Farrington & Phillips, 17 Church, Pa. 1
Frause Peter A. & Co., 35 Fulton, N. Y. 1
Romer Foot & Co., Springfield, Mass. 1
Sanderson Bros. & Co., 18 Cliff, N. Y. 1
Spear & Jackson, 86 Chambers, N. Y. 1
Files, Manufacturers of.
B. & H., 41 and 43 Richmond, Phila. 1
McNichols & Bro., 1722 and 1724 N. 4th, Phila. 1
Schofield's File Co., Providence, R. I. 1
Rosenberg John & Wm., 38 Chambers, N. Y. 1
Wheeler, Clemson & Co., Middletown, N. Y. 1
Filters.
John C. Jewett & Son, Buffalo, N. Y. 1
Fire Arms, Manufacturers of.
Robinson M. W., 79 Chambers, N. Y. 1
Scheringer & Day, 84 Chambers, N. Y. 1
Fire Engines, Makers of.
Bowman O. O. & Co., Trenton, N. J. 1

A. & Sons, Perth Amboy, N. J.
Krechlberg B., 98 Goerck, N. Y.
Newkumet Philip, 3rd and Vine, Phila.
Lambert, 70 Wall, N. Y.
Watson John R., Perth Amboy, N. J.

Filnt and Emery Paper and Cloth.
Cowdell Mfg. Co., 113 Chambers, N. Y.

Fluting Machines. Makers of.
Tuckers & Tuckers, Newark, N. J.

Gage Cocks and Damper Regulators.
Murrill & Kelzer, Baltimore, Md.

Galvanized Iron.
Lefferts Marshall Jr., 91 Beekman, N. Y.

Galvanized Wire.
Field & Reed, 47 John, N. Y.

Gate Hinges, Self-Closing. Makers of.
Clark & Co., Buffalo, N. Y.

Glass, Importers of.
Lawing A. C. & Co., 57 Beekman, N. Y.
Turner & Harmon, 193 State, Boston

Glu Pois, Family. Makers of.
J. E. Stevens Co., Cromwell, Conn.

Grindstones.
McDonough J. & Co., Cleveland, O.
Wood Walter R. & Co., 283 and 285 Front, N. Y.

Gunpowder. Makers of.
Kneeland F. L. (Dupont) 70 Wall, N. Y.
Laird & Powder Co., 21 Park, N. Y.

Hammers, etc., Manufacturers of.
Emmet Hammer Co., Brooklyn, E. D., N. Y.
Hammond C. & Son, 13 N. 5th, Phila.

Hardware. Brass and Galvanized.
Hiebert W. J., 230 Pearl, N. Y.

Hardware, Commission Merchants.
Fernald & Sise, 100 Chambers, N. Y.
Hall & Co., 100 Chambers, N. Y.
Graham & Hafnes, 88 Chambers, N. Y.
Halley J. E., 76 Reade, N. Y.
Wardlaw John, 55 Chambers, N. Y.

Hardware Dealers.
Brown, Harris & Hopkins, 190 Greenwich, N. Y.
Finney Thos. I. & Co., Vicksburg, Miss.
Hudson Hardware Mfg. Co., 21 Park, N. Y.
Lloyd, Supplee & Walton, 625 Market, Phila.
Loudenback, Gilbert & Co., 33 Chambers, N. Y.
Lynch & Co., Buffalo, N. Y.
Turner, Seymour & Judde, 64 Duane, N. Y.
Walsh, Coulter & Flager, 33 Chambers, N. Y.

Hardware Importers.
Becker & Co., New York, N. Y.
Boker Hermann & Co., 101 Duane, N. Y.
Field Alfred & Co., 47 John, N. Y.
Harris & Co., 5 Chambers, N. Y.
King H. & J. W., 30 Chambers, N. Y.
E. Frith, 16 Cliff, N. Y.
Hartmann, Gilbert & Co., 55 Chambers, N. Y.
Van Wert & Co., 43 Chambers, N. Y.
Turner R. A., 31 Chambers, N. Y.
Wiebusch F., 34 Chambers, N. Y.

Hardware Manufacturers.
Biddle Mfg. Co., 75 Chambers, N. Y.
Cheritree T. F. & Co., 113 Chambers, N. Y.
Corbin & F., 51 Chambers, N. Y.
Dunbar House Chambers, N. Y.
Enterprise Mfg. Co., Phila.
Hart, Balven & Stead Mfg. Co., 243 Pearl, N. Y.
Kellogg Wm. P. & Co., Troy, N. Y.
Lane, Gale & Co., Troy, N. Y.
Loudenback, Gilbert & Co., 33 Chambers, N. Y.
Many F. L. & Marshall, 48 Warren, N. Y.
Middleton Tool Co., 82 Chambers, N. Y.
Parker & F., 51 Chambers, N. Y.
Pratt & Co., Buffalo, N. Y.
Providence Tool Co., 11 Warren, N. Y.
Rogers & Co., 45 Chambers, N. Y.
Schweitzer Mfg. Co., 51 Reade, N. Y.
Shattuck W. F. & Co., 113 Chambers, N. Y.
Stanley Mfg. Co., 55 Beekman, N. Y.
Stearns Mfg. Co., New Britain, Conn.
Turner, Seymour & Judde, 64 Duane, N. Y.
Union Mfg. Co., 55 Chambers, N. Y.
Whitcomb White & Churchill, 23 Warren, N. Y.
Wilson Mfg. Co., 31 Chambers, N. Y.

Hardware Specialties.
Biddle Mfg. Co., 75 Chambers, N. Y.
John A., rear 116 Vanhook, Phila.
Holton F. G. & Co., Cincinnati, O.
Loudenback, Gilbert & Co., 33 Chambers, N. Y.
Sennel Birge & Co., St. Louis.

Helve Hammers. Makers of.
Bradley Mfg. Co., Syracuse, N. Y.

Holding Engines. Makers of.
Otis Bros. & Co., 345 Broadway, N. Y.

Horse Nails. Makers of.
American Nail Co., 25 Chambers, N. Y.
Brundage & Co., Middletown, N. Y.
Globe Nail Co., Boston, Mass.
Henderson & Paul, N. Y.
Putnam S. S. & Co., Neponset, Mass.

Horse Shoes. Makers of.
Burden Iron Works, Troy, N. Y.

Hubs and Spokes. Mfrs. of.
Glendon J. 2nd and Diamond, Phila.

Hydraulic Jacks.
Dudgeon Richard, 24 Columbia, N. Y.

Ice Cream Freezers. Makers of.
Blatchley C. & Co., Commerce, Phila.
Packard Wm. Phila.
Shepard Sidney & Co., Buffalo, N. Y.
Thorp E. S. & J., 166 Fulton, N. Y.

Insurance Brokers.
Hartford Steam Boiler and Inspection Co.

Insurance Fire and Marine.
National Fire Ins. Co., 82 Wall, N. Y.

Iron. Brokers.
Byrnes Geo. A., 70 Wall, N. Y.
Hazard & Jones, 212 Pearl, N. Y.
Petit Wm. H., 72 Wall, N. Y.

Iron. Corrugated. Manufacturers of.
Corrugated Metal Co., East Berlin, Conn.

Iron. Charcoal. Warm or Cold Blast.
Quincy John W. & Co., William, N. Y.

Iron Commission Merchants.
Blackston & Cox, 533 Walnut, Phila.
Blackston & Co., 212 Chestnut, Phila.
Hoopes W. Graham, 419 Walnut, Phila.
Malin Bros., 226 Dock, Phila.

Iron Fig. Manufacturers of.
William James & Co., 69 Wall, N. Y.

Iron Dealers.
Abbott Brothers, 190 South, N. Y.
Bonnell, Rotaford & Co., Youngtown, O.
Borden & Lovell, 70 and 71 West, N. Y.
Buchanan J., 16 Birchen Lane, London, E. C.
McClellan Brown & Co., 8 Oliver, N. Y.
Coddington T. B. & Co., 25 Cliff, N. Y.
Conklin & Haeruel, 29 Market Slip, N. Y.
Deane Wheeler, 235 Pine, N. Y.
Fuller, Lord & Co., 189 Greenwich, N. Y.
Fuller, Dana & Fitz, 110 North, Boston
Fuller Wm., 228 Grant, N. Y.
Hall, Kimbark & Co., Chicago.
Harrison & Gilison, 528 to 532 Water, N. Y.
Hay E. & G. A., 22 Wall, N. Y.
Jackson & Chase, 206 and 208 Franklin, N. Y.
Judson B. F., 457 and 459 Water, N. Y.
Lyons Chas. W., 135 Wall, N. Y.
Packard, Golf & Co., Youngstown, O.
Persons & Co., 24 Broadway, N. Y.
Reid Wm., 28 West, N. Y.
Quincy John W. & Co., William, N. Y.
Richards D. W. & Co., 92 Mangin st., N. Y.
Smith Gam'l G. & Co., 342 Park, N. Y.
Taylor A. B. & Sons, 23 and West, N. Y.
Williamson James & Co., 69 Wall, N. Y.
Whitner Alfred H., 58 Hudson, N. Y.

Iron. Manufacturers of.
Atwater, Wheeler & Co., New Haven, Conn.
Britannia Iron Works, Middlebro', Eng.
Allen Watson, Troy, N. Y.
Cartwright, McCurdy & Co., Cleveland, O.
Cleveland Rolling Mill Co., Cleveland, O.
Edwards, Brown & Co., 8 Oliver, N. Y.
Ellis W. R. & Co., 17 Batterymarch, Boston
Everson, Graff & Macrum, Pittsburgh, Pa.
Fulton & Co., 43 West, N. Y.
Jones & Laughlins, Pittsburgh, Pa.
Leonard John, 424 and 424 West at, N. Y.
Lynchburg Iron Co., Milwaukee, Wis.
Miller & Co., 110 West, N. Y.
Niles Iron Co., Niles, O.
New Haven Rolling Mill Co., N.Y.
O'Donoghue Iron Works Co., Richmond, Va.
Oxford Iron Co., 61 Washington, N. Y.
Phenix Iron Co., 410 Walnut, Phila.
Reid Wm., 28 West, N. Y.

Iron Hoop. Manufacturers of.
Wm. Clark & Co., Pittsburgh, Pa.

Iron. Sheet. Importers of.
Jeasop Wm. & Sons, 91 and 93 John, N. Y.
Mitander Nils, 69 William, N. Y.

Lace Leather. Manufacturers of.
Pease & Co., Boston, N. Y.

Style Wm. H., 48 Liberty, Phila.

Lawn Mowers. Manufacturers of.
Howard & Morse, 45 Fulton, N. Y.

Lead. Manufacturers of.
Lawn Mowers, 45 Fulton, N. Y.

Lead and Tin Lined Lead Pipe, etc., Mfrs.
Colwell, Shaw & W. Mfg. Co., 213 Centre, N. Y.

Locks. Manufacturers of.
Crawford Lock Co., Norwich, Conn.
Romer & Co., Newark, N. J.
Sargent, Greenleaf & Cole, 300 Broadway, N. Y.
Yale Lock Co., 238 Broadway, N. Y.

Locksmith. Makers of.
Yale Lock Co., 238 Broadway, N. Y.

Machinery. Makers of.
Piaskali Landing Mch. Co., 63 Bleeker, N. Y.
Mason V. W. & Co., Providence, R. I.
Merrill & Co., Worcester, Mass.
Paunder & Co., Providence, R. I.
Harrington Edwin, 15th st. and Pa. ave., Phila.
Lincoln Geo. & Co., Hartford, Conn.

Malleable Iron Castings. Makers of.
Robert Daniel L., Elizabethport, N. J.
McClintock, 100 Chambers, N. Y.
Whitemore D. H., Worcester, Mass.

Metal Dealers and Brokers.
Belmont & Co., 100 Chambers, N. Y.
Coddington T. B. & Co., 25 and 27 Cliff, N. Y.

Oxigen Gas, Co., 141-5 Lake, Chicago, Ill.
Crane U. O., 134 7th Ave., N. Y.
Harnicke Max, 85 Beaver, N. Y.
Poligal, 100 Chambers, N. Y.
Porter Thomas, 292 Pearl, N. Y.
Quincy J. W., 98 William, N. Y.
Thomson A. A., 211 and 215 Water, N. Y.
Van Wart & McCoy, Chambers, N. Y.

Metallogists.
Britton J. Budgett, 309 Walnut, Phila.
Brown Thomas M., 1123 Girard, Phila.
Henderson James, 50 7th Ave., N. Y.
Maynard & Van Kenseiler, 21 Cliff, N. Y.
School of Mines, E. 40th, N. Y.

Mining and Railroad Tools, &c., Makers of.
Washington Mfg. Co., 51 Park Place, N. Y.

Molders. Tools.
Carter H. & Sons, 290 Pearl, N. Y.

Mower and Reaper Knives. Makers of.
Simonds Mfg. Co., Fitchburg, Mass.

Monuments. Gravestone Bronze.
National Fine Art Foundry, 315 E. 25th.

Mouse Traps. Makers of.
Dietz R. E., 51 and 56 Fulton, N. Y.

Nickel

AMERICAN
American Tack Co., 117 Chambers, N. Y. 27
Field A. & Sons, Taunton, Mass. 27
Grundy Gen. Co., 12 Platt, N. Y. 27
Dunbar, Hobart & Whidden, S. Abington, Mass. 27
Loring Samuel, Plymouth, Mass. 27
Iron Trays, Importers of.
Rose Wm. & Bros., 36th and Elbert, W. Phila. 10
James' Tools and Machines, Makers of.
Peck, Stow & Wilcox Co., 57 Chambers, N. Y. 22
Tools, etc., Makers of.
Grumith I. J. & Bros., Philadelphia, Pa. 26
Valve Expenders.
Dugdale Richards, 21 Columbia, N. Y. 1
Valves, Gas, Water and Steam.
Ludlow Valve Mfg. Co., N. Y. 7
Wire.
Rockus Wire Co., 78 Beckman, N. Y. 21
Fisher & Norris, Trenton, N. J. 21
Howard Iron Works, Buffalo, N. Y. 21
Wilson Mfg. Co., 25 Chambers, N. Y. 21
Wire Lead, Manufacturers of.
Brooklyn White Lead Co., 89 Maiden Lane, N. Y. 25
Colgate Robert & Co., 287 Pearl, N. Y. 25
Cornell Lead Co., Buffalo, N. Y. 25
Jewett John & Sons, 182 Front, N. Y. 25
Lewis John T. & Bros., 221 S. Front, Phila., Pa. 25
Union White Lead Co., 26 Burling Slip, N. Y. 25
Wire, Manufacturers of.
Gilbert, Bennett & Co., 253 Pearl, N. Y. 25
New Haven Wire Co., New Haven, Conn. 25
Parker Sam'l & Co., Wethersfield, Ct. 25
Philadelphia Wire Works, N. 5th, Phila. 25
Corbett Lead Co. & Co., Holyoke, Mass. 25
Townsend W. P. & Co., Pittsburgh, Pa. 25
Washburn & Moen Mfg. Co., Worcester, Mass. 25
Wire Goods, Manufacturers of.
Chicago Wire Cloth Mfg. Co., Chicago, Ill. 25
Hendry & Bartholomew, Ansonia, Conn. 25
Gilbert, Bennett & Co., 228 Pearl, N. Y. 25
Howard & Morse, 45 Fulton, N. Y. 25
Hopkins A. W., West Broadway, N. Y. 25
Howe, Bigelow & Co., Worcester, Mass. 25
Wire Rope, Iron and Steel, Makers of.
Roebbling's John A. Sons, Trenton, N. J. 25
Woods Working Machine & Tool Co., N. Y. 25
S. A. Woods Machine Co., 91 Liberty, N. Y. 25
Wrenches, Manufacturers of.
Corning Japer E., 28 Cliff, N. Y. 25
Cox L. & Co., Worcester, Mass. 25
Philadelphia Tool Co., Phila. 25
Wood Working Machine & Tool Co., Makers of.
Maguire Jas. T., 119 Chambers, N. Y. 25
Wire, Importers of.
Field Alfred & Co., 47 John, N. Y. 25

ESTABLISHED 1835
HARDWARE
BENIS & CALL
SPRINGFIELD
ALL GOODS STAMPED BENIS & CALL
NONE OTHERS GENUINE

Iron & Brass
Full assortment of
ALFRED FIELD
Importers
47 John, and
THE CORRUGATED S
Strogg,
Cheap.
SELLER
48 Cliff Street, NEW YORK.

HARTFORD ST.
INSPECTION AND
CAPITAL
Issues Policies of Insurance, after
Boilers, Buildings
STEAM BOILER
The Business of the Company includes
Full information concerning the plan of the Company
COMPANY'S OFFICE.
or at any Agency.
J. M. ALLEN, Pres. CHAS. M. BEA
Board of
J. M. ALLEN, CHIEF
FRANK W. PRESTON, Pres't
CHARLES M. BEACH, of Beach & Co.
DANIEL PHILLIPS, of Adams Express Co.
GEO. M. BARTHOLOMEW, Pres't
RICHARD W. REED, Sup't
Hon. CHAS. M. FOWD, Treas.
THEO.

and in 1839.

COES & CO.

FER,

ers o,"

UINE

S'

TRENCHES.

ave been very
recently, by
er WIDTS, as
which makes
as strong as a
ordinary way,

COES'

PATENT

RULE

the forced back
handle.

are manufac-
tured dated Feb-
ruary issued June
1871, and Dec-
ember violation of
proposed

particular attention to
Patent Ferrule, with its
ing Nut (shown in section
above cut), which makes
best Ferrule fastening

COES & CO.

Screws.

hand.

& CO.,

reets, N. Y.

PIPE ELBOW

Durable

No Soot,

Better Draft.

MANUFACTURED BY

OW CO.,

Canal Street, CHICAGO.

500,000.

Inspection of the Boilers

Machinery,

LOSSIONS.

Is of STEAM BOILERS.

can be obtained at the

RD, CONN.,

s. J. B. PIERCE, Sec'y

NDERS Sec'y Life Ins. Co.

RAINARD, of Cass, Lockwood & Bra-

FRANKLIN, Vice Pres't Colt's Pat. Fi-

AM, Pres't William L. Linn Co.

ON, Crompton Lock Works, Worcester

N. Pres't Prov. & War. R. R. Prov.

AMMON, of Beader, Adams & Co.

T. of Wm. B. Bennett & Co., Phila., P

CK, Manager,

Branch, No. 1 Park Place

A. G. COES & CO.

WORCESTER.

Mass.,

Manufacturers of

THE GENUINE

COES'

SCREW WRENCHES.


Our goods have been very much improved recently, by making the *Bar WIDE*, as shown in the cut, which makes a 12 in. Wrench as strong as a 15 in. made in the ordinary way, and by using

A 0 00581

NEW PATENT

ARTICLE

Which cannot be forced back into the handle.

 Our goods are manufactured under Patents dated February 7, 1860, (re-issued June 29, 1871), May 2, 1871, and Dec. 26, 1871, and any violation of either will be *vigorously prosecuted*.

We call particular attention to our new Patent Ferrule, with its Supporting Nut (shown in section in the above cut), which makes the strongest Ferrule fastening known.

A. G. COES & CO.

Y Iron & Brass Wood Screws.

Full assortment constantly on hand.

ALFRED FIELD & CO.,

Importers.

47 John, and 5 Dutch Streets, N. Y.

**THE CORRUGATED STOVE PIPE ELBOW,
Strong Piece Durable.**

Long,
Cheap.

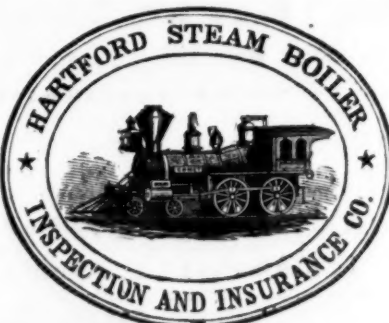


No Soot,
Better Draft.

MANUFACTURED BY

48 Cliff Street, NEW YORK. 27 North Canal Street, CHICAGO.

48 Cliff Street, NEW YORK. 27 North Canal Street, CHICAGO.



CAPITAL - - \$500,000.

Issues Policies of Insurance, after a careful Inspection of the Boilers

Boilers, Buildings and Machinery.

ARISING FROM

STEAM BOILER EXPLOSIONS.

The Business of the Company includes all kinds of STEAM BOILERS,

Full information concerning the plan of the Company's operations can be obtained at the
COMPANY'S OFFICE, HARTFORD, CONN.

or at any Agency.

J. M. ALLEN, Pres. CHAS. M. BEACH, Vice-Pres. J. B. PIERCE, Sec'y
Board of Directors

J. M. ALLEN, President. **THOMAS O. HENDERS, Sec'y.** Mass. Life Ins. Co.
 150 N. BROAD ST. BOSTON, MASS. 100 N. BROAD ST. BOSTON, MASS.

FRANK W. CHENEY, Asst. Treas. Cheney Brothers Silk Manufacturing Co.

CHARLES M. BEACH, of Beach & Co. Arms Mfg. Co.
DANIEL PHILLIPS, of Adams Express Co. AUSTIN DUNHAM, Pres't Williamette Linen Co.
GEO. M. BARTHOLOMEW, Pres't Amer. Nat'l Bank. GEO. CROMPTON, Crompton Loom Works, Worcester

RICHARD W. H. JARVIS, Pres't Colt's Fire Arms Manufacturing Co.
EDWARD REED, Sup't Hartford & N. Haven R. R.

THEO. H. BABCOCK, Manager.

New York Branch, No. 1 Park Place.

No. 11 Warren Street, NEW YORK.



PROVIDENCE TOOL CO.,
Providence, R. I.,
Manufacturers of

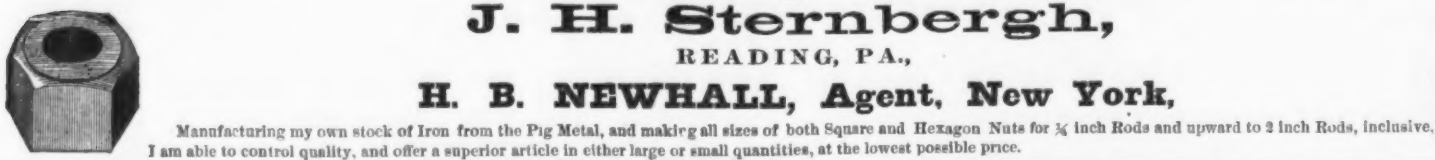
SQUARE AND HEXAGON GOLD AND HOT PRESSED NUTS, PICKS, BOLT ENDS, TURN BUCKLES, CHAIN LINKS, ICE CHAIN, FAST AND LOOSE JOINT HINGES.

Providence
Clothes Wringer.
Reliance
Clothes Wringer

SHIP CHANDLERY
OF
All Descriptions.
Warerooms,
11 Warren, St. N. Y.
H. B. NEWHALL, Ag't.

No. 11 Warren Street,

THE READING BOLT AND NUT WORKS.

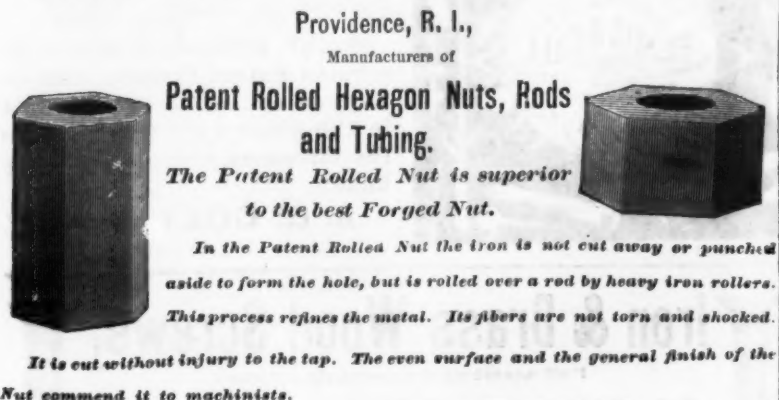


J. H. Sternbergh,
READING, PA.,
H. B. NEWHALL, Agent, New York,

Manufacturing my own stock of Iron from the Pig Metal, and making all sizes of both Square and Hexagon Nuts for 1/4 inch Rods and upward to 3 inch Rods, inclusive. I am able to control quality, and offer a superior article in either large or small quantities, at the lowest possible price.

No. 11 Warren Street,

RHODE ISLAND NUT CO.,



Providence, R. I.,
Manufacturers of

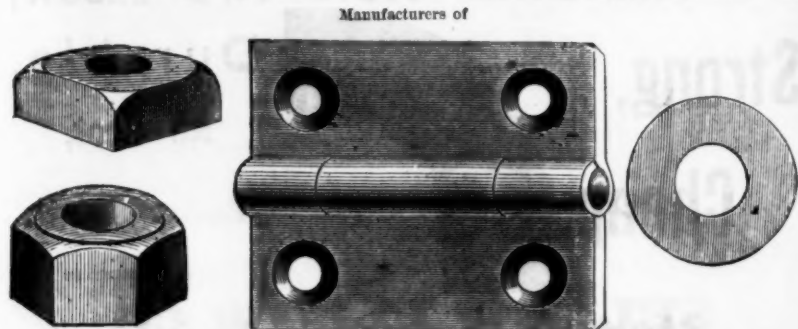
Patent Rolled Hexagon Nuts, Rods and Tubing.
The Patent Rolled Nut is superior to the best Forged Nut.

In the Patent Rolled Nut the iron is not cut away or punched aside to form the hole, but is rolled over a rod by heavy iron rollers. This process refines the metal. Its fibers are not torn and shocked. It is cut without injury to the tap. The even surface and the general finish of the Nut commend it to machinists.

Warerooms: No. 11 Warren Street, New York.

H. B. NEWHALL, Agent.

THE ÆTNA NUT COMPANY,



Manufacturers of

Machine Forged & Hot Pressed Nuts,
Washers, Bolts, Wrought Narrow Butts, Table and Trunk Hinges,
Fellow Plates, Axle Clips, Wrought Clip Yokes, Rivets and Burs,

We desire to call your attention to our **MACHINE FORGED NUTS**. They are made from extra quality of Iron, combining lightness and strength, and are especially well adapted for Agricultural Machinery and Carriage Work.

Our **WASHERS** are made on improved machines—making them perfectly flat, smooth and true, and are warranted superior to any in market.

WAREROOMS: No. 97 Chambers & 79 Reade Sts., N. Y.

C. L. CAMPBELL, Agent.


ARMS, BELL & CO.,

Manufacturers of

Carriage, Tire & Square Head Bolts.

Cold Pressed Nuts and Washers, Etc.,

YOUNGSTOWN, OHIO.

Price lists sent on application.

**CHAS. E. LITTLE,**

59 Fulton Street, New York.

Maker and dealer in

Coopers' and Coachmakers' Carpenters' and Slaters' and Butchers' (Send for Catalogue.)

American Chain Cable Works,

28 Years' Experience in the Business.

KENDRICK & RUNKLE, Trenton, N. J., Manufacturers of Cable, Crane, Coal Mine Slope, Car Brake Chains, Traces, Breast, Binding, Cow and Log Chains of all kinds. N. B.—The highest grades of Crane Chains a specialty.

New England Chain Works

771 Eddy Street, Providence, R. I.

Manufacture Iron Chains of every description.

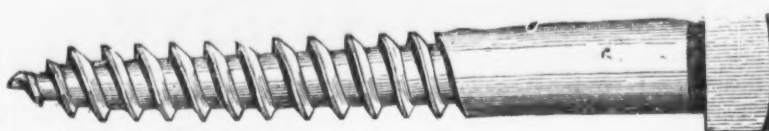
Mowing Machine, Crane, Break,

Draft Chains, &c., &c.

Also, Latest Improved Cotton Can Rings.

THOS. WYATT, Proprietor.

NEW YORK.

**WM. H. HASKELL & CO.,**

Pawtucket, R. I.,

Manufacturers of

Machine and Plow Bolts,

Coach Screws, Set Screws & Tap Bolts.

Warerooms, No. 11 Warren Street, New York.

H. B. NEWHALL, Agent.

NEW YORK.

No. 11 Warren Street,

LEWIS, OLIVER & PHILLIPS,

MANUFACTURERS OF

Merchant Iron & Heavy Hardware,

Carriage, Machine, Square Head, Bridge and Skein

BOLTS,

Nuts, Washers and Coach Screws, Harrow Teeth, Plow Handle Extension Rods, &c.

Bolts, Spikes & Wrought Iron Shapes,

For BRIDGES, DAMS, PIERS, BREAKWATER and other permanent structures, made promptly at a small advance in price of iron.

FOUNDATION BOLTS FOR DAMS, with ends slit by machinery.

Hook and Eye, Screw Hook and Strap, and Strap and T Hinges.

Originators and Patentees of their new line of

WAGON HARDWARE,

Comprising Patent Wagon Box Strap Bolts and Wrought Iron Bolster Plates, Large Head Wagon Rivets, Neck Yoke Eyes, King Bolts, Box Rods, Rubber Plates, Axle Bolts, Queen Bolts, Tongue Cup, Sand Band, Single Tree and other Labor Saving odd shapes of Iron. Send for Prices to

LEWIS, OLIVER & PHILLIPS,

91 and 92 Water Street and 114 and 116 First Avenue, PITTSBURGH, PA.

Or H. B. NEWHALL, Agent, 11 Warren St., New York.

CHALLENGE DOOR & GATE SPRING.PATENTED JULY 11th 1871.**BROWN, HARRIS & HOPKINS,**

Hardware Merchants,

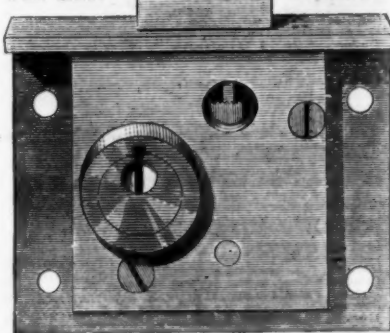
and Manufacturers of the

CHALLENGE DOOR & GATE SPRING.PATENTED JULY 11th 1871.**CHALLENGE DOOR & GATE SPRING.**PATENTED JULY 11th 1871.**CHALLENGE DOOR & GATE SPRING.**PATENTED JULY 11th 1871.

The Challenge Springs are manufactured from Steel Wire, tempered by an Improved Process, the result of repeated experiments, and must not be classed by dealers with the numerous worthless "Coil Springs" made from common Red Spring Wire.

Nos. 180 Greenwich and 58 & 60 Dey Sts., NEW YORK.

Full Size.

**SARGENT, GREENLEAF & COLE,**

300 Broadway, New York,

Manufacturers of

PAD LOCKS,

Drawer, Trunk, House, STORE DOOR AND OTHER LOCKS,

NIGHT LATCHES, &c.,

with Small Flat Keys. Also

BANK and SAFE LOCK.

Send for Price List.

GREENFIELD TOOL CO.,

Sole Manufacturers of

PARKER'S PATENT FORGED OX SHOES,

And the "DIAMOND" Stamp of Extra Cast Steel

Plane Irons.

Also, Bench & Moulding Tools of every description, Polished Planes

in Sets, Plates, Stops, Cuts, &c., &c. Drop and Hammer For-

gings, to order.

Address, for Illustrated Catalogue and prices,

GREENFIELD TOOL CO., Greenfield, Mass.

37 Warehouse in New York, 37 Chambers Street.

**Metallurgical.****MAYNARD & VAN RENSSLAER,**

CONSULTING

Mining and Metallurgical

ENGINEERS,

Experts in Iron and Analytical Chemistry

24 Cliff Street, NEW YORK,

George W. Maynard. Schuyler Van Rensselaer.

THOMAS M. DROWN,

Analytical Chemist

And Consulting Metallurgist,

1123 Girard Street, Philadelphia.

Henderson's Patent Iron.

The "Purified Cast Iron" costs but about \$9 per ton more than common coke Pig Iron, and when mixed with one-half wrought iron makes good Cast Steel. The Wrought Iron from common coke Pig Iron makes Cast Steel equal to that made from the best Swedish Bar Iron.

The "Common" Bar Iron from common coke Pig Iron is stronger, softer and tougher than Low-moor Iron.

The "Common" Boiler Plates from ordinary coke Pig Iron are stronger, 50 per cent. softer and 100 per cent. tougher than Low-moor Iron.

For Licenses to make this iron apply to

JAMES HENDERSON,

30 Broadway, NEW YORK.

The Iron-Masters' Laboratory.

Exclusively for the Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags & Coal for Practical Metallurgical Purposes.

No. 339 Walnut Street, Philadelphia.

J. BLODGET BRITTON,

This Laboratory was established in 1866, at the instance of a number of practical Iron-masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

CHARGES TO IRON WORKS.

For determining the per cent. of pure iron in an ordinary Ore..... \$4 00
For the per cent. of Pure Iron, Sulphur and Phosphorus in do..... 12 50
For each additional constituent of usual occurrence..... 1 50

For those of unusual occurrence or difficult to determine, the charge must necessarily depend upon circumstances.

For determining the per cent. of Sulphur and Phosphorus in Iron or Steel..... 12 50

For each additional constituent of usual occurrence..... 4 00

For the per cent. of Carbonate of Lime, and Insoluble Silicious Matter in a Limestone..... 10 00

For each additional constituent..... 2 00

For the per cent. of Water, Volatile Combustible Matter, fixed Carbon, and Ash in Coal..... 12 50

For determining the constituents of a Clay, Slag, Coke, or of an Ash of Coal the charges will correspond with those for the constituents of an ore.

For a written opinion or letter of instruction the charge must necessarily depend upon circumstances.

Printed instructions for obtaining proper average samples for analysis furnished upon application.

SCHOOL OF MINES,

COLUMBIA COLLEGE,

East 49th Street, NEW YORK.

FACULTY:

F. A. P. BARNARD, S. T. D., LL. D., President.

T. EGGLESTON, JR., R. M., Mineralogy and Metallurgy

FRANCIS L. YINTON, R. M., Mining Engineer.

C. F. CHANDLER, Ph. D., Analytical and Applied Chemistry.

JOHN TORREY, M. D., LL. D., Botany.

CHARLES A. JOY, Ph. D., General Chemistry.

WILLIAM G. PECK, LL. D., Mechanics and Mining Surveying.

JOHN S. VAN AMRINGE, A. M., Mathematics.

OGDEN N. ROOD, A. M., Physics.

JOHN S. NEWBERRY, M. D., Geology and Paleontology.

The plan of this school embraces a three years' course for the degree of ENGINEER OF MINES, or BACHELOR OF PHILOSOPHY.

For admission, candidates for a degree must pass an examination in Arithmetic, Algebra, Geometry and Plain Trigonometry. Persons not candidates for degrees are admitted without examination, and may pursue any or all of the subjects taught. The next session begins October 2nd, 1873. The examination for admission will be held on June 22nd and September 29th, 1873. For further information and catalogues, apply to

DR. C. F. CHANDLER,

Dean of the Faculty.

A. PARDEE, Hazleton, Pa. J. G. FELL, Phila.

A. PARDEE & CO.,

303 Walnut St.,

PHILADELPHIA.

MINERS AND SHIPPERS OF

Lehigh Coals.

The following superior and well-known Lehigh Coals are mined by ourselves, and firmly connected with us viz.

A. Pardee & Co. {HAZLETON, CRANBERRY, SUGAR LOAF

G. B. Markle & Co. {JEDDO, HIGHLAND.

Pardee, Bro. & Co. LATTIMER.

OFFICES:

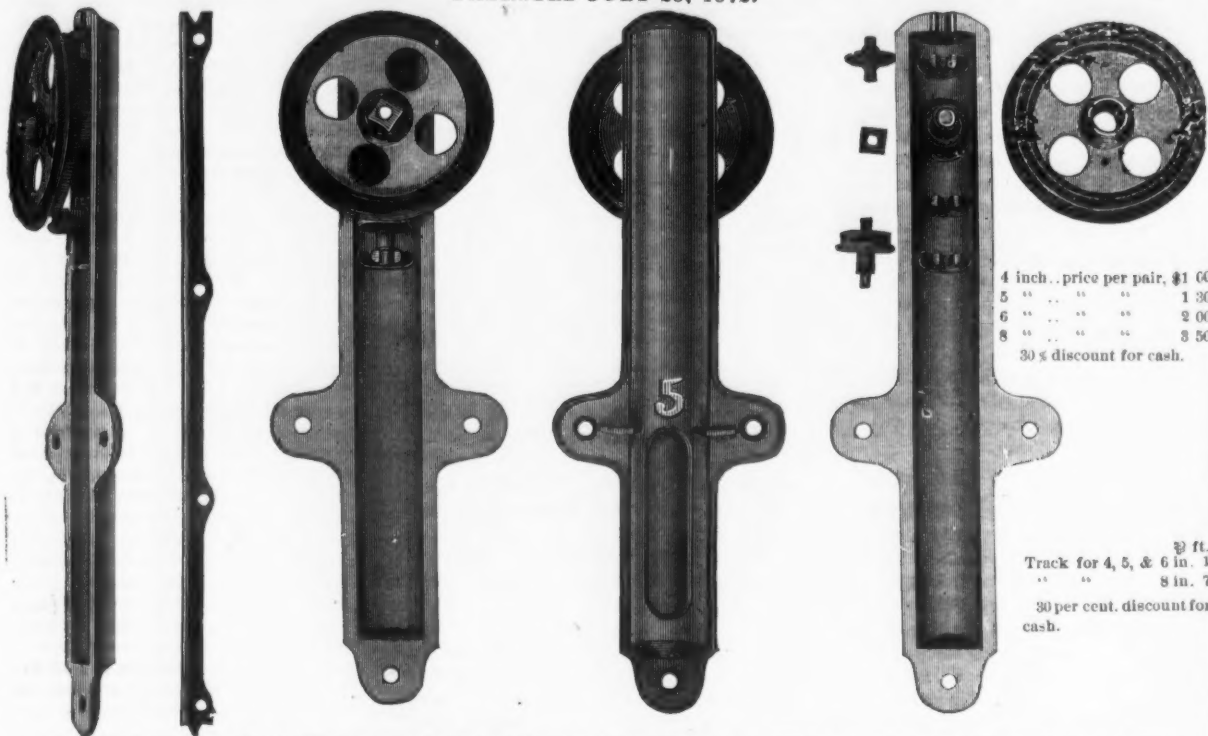
WM. LILLY Mauch Chunk, Pa.

WM. MERRISON, Agent, 111 Broadway N.Y.

WM. H. DAVIS, Agent, Easton Pa.

PATENT NOVELTY HANGER,

PATENTED JULY 23, 1872.



4 inch. price per pair, \$1 60
 5 " " " " " 1 30
 6 " " " " " 2 00
 8 " " " " " 3 50
 30 % discount for cash.

Track for 4, 5, & 6 in. 1
 " " " " " 8 in. 7
 30 per cent. discount for cash.

We, without hesitation, offer this Hanger as the best article in the market for the purpose. Its many advantages over all other Hangers are as follows:
 1st.—It is more than **double as strong** as any other Hanger, owing to its semi-cylindrical or curved back.
 2nd.—It is provided with a friction wheel at the top of the Case, which bears against the rear or outside of the sheaves, and prevents it from leaning outward and causing it to **RUN TRUE**, a feature not attained in any other Hanger.
 3d.—By thus causing the sheave to run true, the doors are always held up **close to the Frame**, and maintain a close joint around it.
 4th.—The sheave has but one flange, there being a lower friction wheel provided with a flange which extends out under the face of the sheave and bears against the outer side of the track, which takes the place of the extra flange in the sheave, thus doing away with the **grooved sheave** which always grinds or breaks.
 5th.—**IT CAN NEVER RUN OFF THE TRACK.**
 6th.—It is the **easiest running** Hanger made, our 5 in. answering the same as 6 in. of the checkback and ordinary makes.
 7th.—It is the **most complete** Hanger, in its construction, being **tasty**, as well as **durable**.

LOUDBACK, GILBERT & CO., 53 Chambers Street, New York City.

Also Agents for the CONNECTICUT CUTLERY CO., of Naugatuck, Conn., and keep on hand a complete assortment of their goods.

FISHKILL LANDING MACHINE CO.,

[Established 1853.]

FISHKILL-ON-THE-HUDSON, N. Y.

MANUFACTURERS OF

STEAM ENGINES,**And MACHINERY of every Description.**

New York Office, 63 Bleecker Street.

JAS. L. TELLER, Secy.

MILO SAGE, Prest.

MINOT & CO., Oliver Street, Boston,

Selling Agents Lowell Wrench Co.'s

TRIPLE ACTING RATCHET DRILL, the Simplest, Cheapest and Best.

MANUFACTURERS OF
HAMMERS,
 Sledges,
BLACKSMITHS'
 AND
 Stone Masons'
TOOLS,
 Bush Hammers,
 etc., etc.



AGENTS FOR
 Washoe Picks,
 Western Files,
 Sweet's Crow Bars,
 N. Carolina Handles,
 Steel Foundry Riddles,
 Beaver Falls Cutlery,
 etc., etc.

Send for Price Lists and Discounts.

THE "WASHOE" TOOL MFG. CO.,

SOLE MANUFACTURERS OF THE

Celebrated "Washoe" Rail Road and Mining Picks,

including all other adze eye tools. First premium was awarded by the American Institute Fair in 1868, to this Company.



Have constantly on hand a large supply of COAL, RAIL ROAD AND CALIFORNIA OR MINERS' PICKS. We claim that OUR PRICES ARE LOWER and our picks are SUPERIOR to any thing in this country.

Liberal discount to large dealers. Send for price list.

Post Office Box 3170.

J. J. Anderson, Prest.

To insure attention all communications must be addressed to **H. H. TRENOR, Treas.**

New York Office, 61 and 63 Park Place and 5 College Place.

Henry H. Trenor, Treas.

John H. Allen, Secy.

GIVEN AWAY.**A Fine German Chromo.**

We send an elegant Chromo, mounted and ready for framing, free to every Agent for

UNDERGROUND;

or, Life Below the Surface.

BY THOS. W. KNOX.

9-12 PAGES OCTAVO.

130 FINE ENGRAVINGS.

Relates Incidents and Accidents beyond the Light of Day; Startling Adventures in all parts of the World; Mines and Mode of Working them; Under-currents of Society; Gambling and its Horrors; Caverns and their Mysteries; The Dark ways of Wickedness; Prisons and their Secrets; Down in the Depths of the Sea; Strange Stories of the Detection of Crime.
 The book treats of experience with brigands; nights in opium dens and gambling hells; life in prison; stories of exiles; adventures among Indians; journeys through sewers and catacombs; accidents in mines; pirates and piracy; tortures of the inquisition; wonderful burglaries; underworld of the great cities, etc., etc.

AGENTS WANTED

for this work. Exclusive territory given. Agents can make \$100 a week in selling this book. Send for circulars and terms to agents.

J. B. BURR & HYDE, Hartford, Conn., or Chicago, Ill.

NORWICH LOCK MFG. CO.

Salesrooms:

Norwich, Conn.

Adams & Chute,

4 Liberty Sqr., Boston.

88 Chambers St., N. Y.

John C. Brenner, Son & Co.,

21 North 5th St., Phila.

GOOCH'S I-X L**ICE CREAM FREEZER**

FOR CONFECTIONERS' AND FAMILY USE.



Superior to all.
 Makes the best Cream.
 Takes the least ice.
 Looks the best.
 Is the most substantial.
 Cannot get out of order.
 Any person can use them.
 Recipe Book in every Freezer.
 Gives satisfaction to all.
 And therefore

SELLS and PAYS

the best of any Freezer made.

Manufactured by

CHARLES GOOCH,

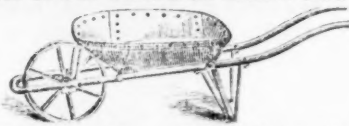
Cincinnati, O.

Represented in the East by

JAMES E. HALSEY,

76 Reade Street, New York.

Send for Circular and Price List.

All Iron Wheel Barrows

We are now making over 20 different sizes and patterns of these Barrows, adapted to coal, foundry and railroad use, brick makers, and others. Also
 Coke Cars, Coal Tubs, Dock Blocks
 & Ash Buckets for Steamers.
 Send for Price List.

JAMES E. HALSEY, Mfrs.' Agent,
 76 READE STREET, N. Y.

**IMPROVED****UNIVERSAL WRINGER**

Sold by Jobbers of Hardware and Woodenware everywhere.

Metropolitan Washing Machine Co.,
 32 Cortlandt Street, New York.

Get Binders**FOR THE IRON AGE.**

We have made arrangements to furnish Koenig's PATENT BINDER, which we think altogether the best before the public, to our subscribers at the following very low rates—about the wholesale prices by the dozen.

Half Cloth.....\$1.00 each.

(Cloth Back and Corners, with Morocco Paper Sides—a good, serviceable Binder.)

Full Cloth.....1.50

(Morocco Cloth Back and Sides.)

Half Roan.....1.75

(Roan Back; Cloth Sides.)

Half Morocco.....2.00

(Morocco Back and Corners; Cloth

The above are all in black, which is the most serviceable color, with the exception of the Half Morocco, which are put up in a number of handsome shades. The name of the paper is stamped in gold on either side, and each Binder is furnished with loops by which it can be hung up against the wall as newspaper files are usually disposed of.

The Binders will each hold the numbers for six months in about the same shape as a bound volume. They can be nicely inserted in two or three minutes by any boy of ordinary intelligence; and when the covers are full they can be either preserved in that shape as bound volumes of *The Iron Age* or they can be emptied and used again. There is no possibility of their getting out of order, unless the cords, which are very strong, wear out, when anyone can easily replace them with a piece of fishing line or other suitable string.

Subscribers who value the paper should order them at once, so as to have the paper in good order from the commencement of the volume.

On receipt of the price we will ship them, safely put up, by any express line or to any New York house to be packed. They are too large to be sent by mail.

EMMET HAMMER CO.,

Manufacturers of all kinds of

Hammers and Sledges,

AND

Contractors' Tools,

Brooklyn, E. D., New York.

The Iron Age.

New York, Thursday, June 19, 1873.

DAVID WILLIAMS, . . . Publisher and Proprietor.
JAMES C. BAYLES, . . . Editor.
JOHN S. KING, . . . Business Manager.

The Iron Age is published every Thursday morning, at No. 10 Warren Street, New York, on the following terms:

SUBSCRIPTION.
Regular Weekly Edition, \$4.00 a year.
Semi-Monthly, 2.00 " "
1st and 3d Weekly Nos. in each month.
Monthly, 1.00 " "
1st Weekly No. in each month.

ADVERTISING.
One square (12 lines, one inch), one insertion, \$2.50;
one month, \$7.50; three months, \$15.00; six months
\$25.00; one year, \$40.00; payable in advance.
All communications should be addressed to
DAVID WILLIAMS, Publisher,
10 Warren St., New York.

City Subscribers will confer a favor upon the Publisher, by reporting at this office any delinquency on the part of carriers in delivering *The Iron Age*; also, the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in hall ways or upon stairs; and it is our desire and intention to enforce this rule in every instance.

REMOVAL.

THE OFFICE OF
THE IRON AGE
Has been removed to
**10 Warren St.,
NEW YORK.**

CONTENTS.

First Page.—Lindell's Steam Road Roller and Tractor Engine. The Iron and Steel Institute. Mining and Metallurgy in Russia.
Third Page.—New Patents. Suggestions Concerning Blast Furnace Management. Vienna Exposition Notes.
Fifth Page.—On the Molecular Changes Produced in Iron by Variations of Temperature.
Ninth Page.—Business Items.
Thirteenth Page.—The Iron Age Directory.
Sixteenth Page.—English Investments in American Mining Lands and Iron Works. How We are Being "Ruined" by Protection. Discriminating Freight Rates. What We Have to Show for It. Scientific and Technical Notes.
Seventeenth Page.—Scientific and Technical Notes—concluded. Railway Improvements.
Eighteenth Page.—Trade Report.
Nineteenth Page.—Trade Report (concluded). Our English Letter.
Twenty-third Page.—New York Wholesale Prices of Hardware and Metals.
Twenty-fourth Page.—New York Wholesale Prices (concluded).
Twenty-seventh Page.—Philadelphia, Buffalo, Boston and Pittsburgh Hardware and Metal Prices.
Twenty-ninth Page.—Chicago, Cincinnati, St. Louis, and Detroit Hardware and Metal Prices.

English Investments in American Mining Lands and Iron Works.

When, less than two years ago, *The Iron Age* reduced the vague prediction of ultimate American supremacy in the iron trade to a certainty of the near future, we were regarded in some quarters as underestimating the difficulties to be encountered in competing with England, and as exaggerating the present importance of our greater resources of ores and fuel. Especially in England were our views of the industrial futures of the two countries received with doubt, and our views were quoted abroad only as illustrating what our British contemporaries were pleased to consider a phase of national vanity quite characteristic of the American people. Within the past few months, however, those same journals have echoed, though not without reluctance, the opinions expressed by us when the British iron trade was in the enjoyment of an unexampled prosperity, and if it were desirable to prove by unanswerable arguments that the United States, and not Great Britain, will wear the iron crown in the future, we could not do better than to quote them from the editorials of our British exchanges discussing the situation and the outlook. For example, the *Iron and Coal Trades Review* of May 28th says:

The address which Mr. Isaac Lowthian Bell delivered a few weeks ago before the Iron and Steel Institute, at the general meeting in London, made special reference to a subject that is now beginning to engage the attention of the British iron trade. We allude to the remarks of the President upon the future prospects of the iron industry in the United States. It is dwelling upon the British investors, and especially upon the class of large capitalists, that the immense—were had almost said inexhaustible—resources of America in iron and coal cannot fall before long to place this part of the world in the front rank as a center of the iron manufacture. For several years past this industry has been developed with giant strides. In all directions we hear of new blast furnaces being erected, of new rolling mills and Bessemer steel works being put in operation, and of extensive mineral tracts being opened up by the construction of railways, that will afford facilities for still further extensions of mining and metallurgical operations. The United States have for some time been more closely associated by British investors with all kinds of wild speculative schemes connected with Nevada and other Western silver and diamond mines. The most fabulous profits have been promised, and, as a general rule, the unlucky investor has found, when too late, that he has been thoroughly taken in. The silver and diamond mine fever is, it is to be hoped, gone by, but though the representatives of the advanced civilization of the Far West have succeeded in misleading a too credulous British public, that is no reason why everything connected with American enterprise should be put down as equally unsatisfactory and unpromising. The fact is, that the Americans themselves have been wise enough to see through the schemes that have been introduced in great numbers in connection with gold and silver mining, and have allowed European investors to monopolize the riches of Californian enterprise. But in iron and coal they have been sufficiently keen to lay hold of and to work as much as their capital would allow, but the resources of the country are so vast, that one hundred times the present capital might find a highly remunerative out-

let in the development of the American iron and coal tracts. Notwithstanding the number of new furnaces and ironworks that have been erected within the last two or three years, the consumption of iron is far in excess of the means of native supply, and large profits have been made by all connected with the iron and coal trades. In many instances the whole capital of a new establishment has been returned in profits during a single year, and the amounts realized by the ironmasters in the States are such, that the best things done in this country are insignificant by comparison. The Pittsburgh ironmasters can afford to convey the iron ore they require for upward of one thousand miles, and yet can realize immense profits, but the development of railways is now opening up tracts of country where the coal, limestone, and ironstone are in close contiguity, and where pig iron can doubtless be made at a very much less cost than in the older centres of the American iron trade. There is an almost unlimited field for British capital in opening up the mineral proper lies that are thus being rendered accessible by the construction of new railways, and we are not surprised to learn that several American iron companies will, before long, be introduced here.

The most careless reader of the above extract will notice two things: the wisdom of the United States in the adoption of a policy favorable to the growth of domestic industry and the development of native resources, is tacitly admitted, and nothing is said about the advisability of throwing open our ports and depending upon Great Britain for the supplying of our necessities. The editor of the *Iron and Coal Trades Review* has seen enough of this country to know that we need not look abroad for iron to make good the deficiency of our present production; and he is sufficiently intimate with the condition and prospects of British iron manufacture to know that this country offers opportunities for the profitable investment of capital far greater than can be found at home. It cannot but be admitted, even by the iron masters whom he addresses, that his remarks are temperate and truthful, and his suggestions good. Already a great deal of English capital has sought and found profitable investment in mining lands and furnace sites in this country, and there is room for millions more. Probably one of the companies alluded to by the *Review* as about seeking capital in England is the Mississippi Valley Trading Society, for the promotion of trade with, and the investment of British capital in, the Western and Southern States, organized in London on the 12th instant. Among the promoters of the enterprise are some of the wealthiest Englishmen, including John Crossley, of Yorkshire; George Wostenholme, of Sheffield; Alfred Field, of Birmingham; Donald Nicolai, of London, and Sir Edward Pierson, of Wimbledon. The high character of these gentlemen, most of whom are well and favorably known in this country as merchants of unquestioned integrity, is a guaranty of the genuineness of the enterprise, which will probably realize, in all respects, the expectations of those who may subscribe to its securities. Of the other American companies about to negotiate their securities in the English market, we know nothing as yet; but we would remind our friends across the Atlantic that the best opportunities for investment in iron manufacture do not long go begging, and that, while the enterprises presented to their notice may merit confidence, they will also bear the closest and most careful scrutiny. We have no wish to see the confidence of English investors in American coal and iron mining, furnace and rolling mill property shaken by the "financiering" of irresponsible adventurers, representing bogus enterprises.

How We are Being "Ruined" by Protection.

A correspondent of *The Engineer*, writing from Birmingham under date of May 30th, indulges in the following interesting gossip about the comparative cost of certain forms of English and American iron: "The great advantage which the prevailing very high prices of iron have given to the iron masters in the United States is seen in a circumstance that has come to my knowledge, to the effect that a consumer of strip iron in South Staffordshire is now making arrangements for the obtaining of no less than a thousand tons of that kind of finished iron from the rolling mills on the other side of the Atlantic. Instances are again and again being made known of the effect of these same high prices of iron upon different goods made of iron; but it has not yet been stated that railway axles made in the United States can be sold in that country at £3 per ton under the prices charged there for the axles of the leading South Staffordshire makers. Yes; that is the case, we are assured."

Appropos to the foregoing is the following, which we take from *Iron* of recent date: "What is really the money difference between the prices of iron in England and in America? That is a question of vast importance to all in the iron trade, on its answer depending more than one arrangement as to wages of men, beside the maintenance of present prices in this country. A contribution to exact knowledge on this point is furnished by the following figures, obtained from a Liverpool shipping firm of high standing in the iron trade:

Merchant bars at works in Staffordshire.	14 10 0
Freight to Liverpool.	0 10 0
Freight charges.	0 2 6
Freight to New York.	1 2 0
Insurance.	0 1 6
Commission.	0 6 0
Duty.	4 14 6
Total.	21 6 6

"Present selling price of American merchant bars, out of store, at New York, \$103. 38 17 6
"Selling price of American bars at works in Pennsylvania, \$90. 16 6 8
"Thus the balance in favor of American iron is £2.9 per ton. Evidently, as long as this is the case, Americans will prefer to encourage their own manufactures, and while demand will stimulate supply across the Atlantic, the reversed operation will probably be in progress here, and prices 'will fall.' Of course, we know it is very foolish in us to prefer to encourage our own manufactures at the expense of England's export trade, for we have been told so a great many times by eminent political economists, and cannot plead ignorance as the policy for our error. But then we do prefer it, notwithstanding, and however injurious the policy may be, it is not ruining us as rapidly as might be expected.

Discriminating Freight Rates.

The law enacted last year for the regulation of charges for transportation over State railroads, having been pronounced unconstitutional, the Legislature of Illinois has ventured a second experiment, which cannot be said to promise much in the way of beneficial results. Among other things, the new law provides substantially as follows: If any such railroad corporation shall charge, collect or receive for the transportation of any passenger, or freight of any description, upon its railroad, for any distance within the State, the same, or a greater amount of toll or compensation than is at the same time charged, collected or received for the transportation, in the same direction, for any passenger, or like quantity of freight of the same class, over a greater distance of the same railroad, such company shall, upon conviction thereof, be fined in any sum not less than one thousand dollars, nor more than five thousand dollars, for the first offense; and for the second offense not less than five thousand dollars, nor more than ten thousand dollars; and for a third offense, of not less than ten thousand dollars, nor more than twenty thousand dollars; and for every subsequent offense and conviction thereof, shall be liable to a fine of twenty-five thousand dollars.

This is, practically, what has been proposed in certain bills urged upon the attention of the Legislature of this State during the past two or three years, and it is interesting to note the effect of the "reform" in Illinois. As it stands, the law is a prohibition of the custom everywhere followed by railroad companies of carrying through freights at lower rates than are charged upon local freights, and now that the companies have revised their schedules in conformity with its provisions, it is discovered that Chicago merchants will, in all probability, have to abandon business with such points as Peoria, Rock Island and Bloomington, as they will find competition with St. Louis and Cincinnati impossible. Under the new *pro rata* tariff, no concessions can legally be made in the interest of commerce, and Chicago will find herself at a great disadvantage compared with other and competing cities. The rate per cwt. between Chicago and Peoria, for example, is advanced from 35 cents to 67 cents on first class, and from 20 to 34 cents on fourth class. Between Chicago and Rock Island, from 60 to 67 cents for first class, and from 25 to 39 cents for fourth class; and many other important advances may be noted which will turn a great deal of profitable trade from Chicago to St. Louis and Cincinnati. In local rates there is no reduction; indeed, in some instances they will be advanced. In arranging their schedules the companies have been very careful to avoid any violation of the strict letter of the law, but it is quite certain that the business of the State will suffer, and that the "reform" will, in the long run, increase the evils which it is designed to remedy. The only ones benefited by the law will be the railroad companies operating lines terminating outside of the State and tributary to the business of other cities than Chicago. And now that the people of Illinois have a law which the railroad companies are disposed to obey, it is doubtful if they will find it any more satisfactory than the one which they could not enforce, and which was finally decided inoperative by the courts.

What We Have to Show for It.

We take the following from an article in the *World*, commenting on the telegraphic dispatch from London announcing the importation of American iron into Wolverhampton:

Our iron manufacture is the oldest manufacture we have; it has always been protected, and it is the one in which we have the greatest abundance of the cheapest materials and the best facilities for their full development. Yet how stand the facts of our progress in this vital manufacture, after a regime of unexampled protection, and during a period in which the demand for the product has been constant and regularly increasing, as well as invariably in excess of the supply, while the prices have been unprecedentedly remunerative?

The question is easily answered. Iron manufacture in this country has not always been protected to an extent sufficient to enable our iron masters to compete with those of Great Britain. If it had been, we should

to-day be exporting largely both pig and manufactured iron, not only to Great Britain, but to the hundred markets which have hitherto looked to her for supplies. The protection afforded to iron manufacture, previous to 1861, was not of the kind calculated to establish confidence in the advantages of iron investments, nor to stimulate production by assuring producers a market for their iron when made. So far as the development of native resources is concerned, see-sawing between a protective tariff under one administration and a revenue tariff under the next, is worse than—or, at least, quite as bad as—having no tariff at all. Since we have had a tariff which gave assurance of continued protection, because sustained and approved by public sentiment, and placed by the necessities of the government beyond the reach of self-styled "revenue reformers," our progress in this "vital manufacture" has been rapid and sustained. In 1860 we produced 919,800 tons; in 1872, 2,400,000 tons, an increase of 160 per cent. In 1860 we imported 71,407 tons of pig iron; in 1872, 193,000 tons, none of which came here in competition with American pig iron, but for special purposes for which it is believed to be better adapted than any American irons, and to meet a demand but little influenced by the comparative cost of American and foreign pig iron. Lately some of our largest consumers of Scotch iron, which is the principal item of our iron imports, have found that they can do very well without it, but in any case it comes to us as a raw material, to be manufactured by American labor. The same is true of pig iron suitable for the Bessemer process, and until we have an abundant supply of American iron suitable for conversion into steel by this method, we shall also need more or less of foreign make. As will be seen from a comparison of prices given elsewhere, many forms of manufactured iron can be made cheaper at home than they could be imported duty free, and it requires no argument to convince any candid person at all familiar with the condition and course of the iron trade that iron is cheaper to-day, by fifty per cent., in this market, than it would have been without the ample protection which has been extended to it during the past ten years. If the *World* desires any further facts to prove that we have something more than an adverse trade balance to show for the protection enjoyed by the American iron manufacturer, we refer it to an article on American hardware published in its issue of May 26th.

The strike of the iron ore miners of the Cleveland district, North of England, has come to an end, and the furnaces have resumed operations. This is a more favorable termination of the struggle than was expected, and the serious inconvenience likely to result to the iron trade of the country from the stoppage of production in this important district is averted. It must not be supposed, however, that the labor question is even temporarily settled. The coal miners of the Lancashire district have struck for higher wages, a strike of artisans and mechanics is threatened in Wolverhampton, and the Scotch miners are threatening to resort to a strike as a means of compelling employers to rescind certain "special rules" with which they are unwilling to comply. A "demonstration," at which about 30,000 persons were present, was held in Edinburgh on the 28th of May, to protest against the enforcement of those rules, and it is considered probable that the dispute will eventuate in a general strike.

Scientific and Technical Notes.

The *American Exchange and Review* gives an interesting account of WICKERSHAM'S PROCESS FOR REFINING PIG IRON, in use at the Dunbar Iron Works, from which we take the following: In carrying out this process, air from the hot blast is forced through the molten metal as it runs from the furnace, the blast being applied through perforations made in the sides of a runner or trough, through which the metal was caused to pass on its way to the pig beds. In the experiments made at Dunbar, the chief difficulty was to get a runner or trough made of such refractory material as to resist the intense heat caused by the energy of the action of the blast. Fire-clay, as a lining to cast iron, was found to be entirely impracticable. With a runner of this material, 10 feet long, it was found that before half the run had passed through, the lower part of the trough was melted off. A runner was then made of wrought iron tubes, 2½ inches in diameter, attached to a wrought iron frame, and lined with a mixture of crushed conglomerate (quartz) and a little fire clay to give it cohesion. The wrought iron shell was made to curve inward over the upper edges, so as to catch and throw back into the current the flying sparks and particles of metal thrown out by the ebullition. Twelve to fourteen tons have been run at a single heat through this trough with ease; and since then Mr. Wickersham has prepared pounded quartz into a shaped brick or tile, with the necessary perforations for the passage of the air, which promises to answer every requirement for steady working. This process originated with Mr. Samuel Wickersham, who first reduced it to practice, although the same

idea was promulgated by Mr. Martien, who visited England in reference to its introduction there; but at that time the Bessemer process was just brought out, and the latter so thoroughly engrossed the attention of iron masters that they were unwilling to investigate the claims of any other method. Notwithstanding the fact that no definite results have yet been accomplished by this process, yet the experiments have indicated that favorable expectations may be entertained of it. Tests of the pig iron made by its use, show it to produce better sheet and hoop iron than that made from the ordinary pig. The iron worked more readily, and in puddling 30 per cent. less "fix" was required, and yet analyses of the treated and untreated irons threw little or no light on the subject. Mr. Pechin stated that in one series the elements remained the same, while in another the merest trifle of phosphorus, silicon, sulphur, and carbon had been eliminated, and his idea was that the improvement is caused by the physical rearrangement of the particles of the iron; but we are inclined to the opinion expressed by Prof. Cox, of Indiana, who believes that by the chemical action of the blast through the molten iron, there was an elimination of some impurity. Although this process bears some resemblance—in principle, at least—to the Bessemer process, yet its mode of application is very different; and if the difficulties in the way of obtaining a sufficiently infusible material for the runner can be surmounted, it may, perhaps, assume a position of vast importance. The idea of Mr. Wickersham, at least, contains a germ well worthy of careful cultivation.

A new process for making STEEL DIES.

Is spoken of, which consists in heating the metal to a white heat in a close chamber, to exclude the air, and then pressing it upon the material to be copied. It is claimed that by means of this process the hardest steel may be stamped by any soft metal—even lead—so as to make a perfect die of the objects impressed. A carved ring, for instance, might be used to stamp its own image on the hardest and most finely tempered steel, reproducing all its delicate tracing and outline with absolute precision and perfection without injury to the stone. It is said that the secret of thus being able to bring together friable and easily melted substances, such as lead or precious stones, with semi-fused steel consists in the process of heating the steel disc, which must be of a certain degree of temperature. Admitting the possibility of such a thing, we might remark that it may be used for the cheap reproduction in steel of any kind of engraving in wood, copper or type metal. The most elegant chisels, heretofore made at great expense, might thus be cheaply stamped, and the small castings of copper, brass and bronze, might be imitated in the hardest steel. Stereotype plates that will defy the wear of years may be made in the same manner.

An exchange describes a new process of ENAMELING CAST IRON PUMP CYLINDERS.

as follows: They are laid for two or three hours in an acid bath, and then well washed off with water and brushes. A mass consisting of thirty-four parts quartz, fifteen parts borax and two parts carbonate of soda, is then uniformly spread on; the pipes are then heated for ten minutes in a muffle of a semi-circular cross section, three feet wide and nine feet long. They are then withdrawn, cooled, and coated uniformly with a glazing composition consisting of thirty-four parts feldspar, nineteen parts quartz, twenty-four parts borax, sixteen parts oxide of tin, four parts fluor spar, nine parts carbonate of soda and three parts nitre. The mass is prepared by melting the materials together in a crucible and then grinding them in a mill, with the addition of water. After the cylinders have been covered with the glazing, they are heated in a muffle to a white heat for twenty minutes, and are then withdrawn and coated with coal tar before they are cold.

It is only within a comparatively short time that elaborate experiments have been made to find the laws of temperature and moisture at any considerable depths in the mines. M. Simonin, however, has recently published the results of a series of experiments for the purpose of ascertaining the increase of

ATMOSPHERIC PRESSURE IN DEEP MINES, and especially such as go below the surface of the ocean. M. Simonin says as this increase has generally been found to be 1 millimetre for every metre as we descend, it remains to be seen whether the same would be the case in the shafts of mines where the air, confined in a narrow space, is at the same time exposed to the action of a powerful draught, and more or less impregnated with steam, and at variable temperatures. Operating in very deep shafts, our author had the opportunity of bringing the barometer below the level of the sea. His experiments were conducted in the basin of the Saône and Loire, where the coal pits of the Croizat and Epine are situated. The shafts are here 400 metres deep, and since the average reading of the barometric altitudes at the office is about 355 metres above the level of the sea, M. Simonin operated at a clear depth of 45 metres below that level. From his observations, it appears that at Epine, as regards temperature, there is an increase of 1° Centigrade for every 50 metres of vertical descent; and, as regards pressure, a rise of 1 millimetre in the barometer for 11' of vertical descent. At the Croizat there was an increase of 1° in the temperature for every 40' of vertical descent, and an increase of pressure of 1 millimetre for every 10 metres. The averages, therefore, are: For temperature, 1° for 45 metres; and for pressure, 1 millimetre for 10½ metres. M. Simonin has taken care to operate only on shafts through which pure air enters; for the air that leaves the mine is vitiated, and unduly heated from various causes. The shaft should also be water-

tight, and the wood work, as much as possible, free from decomposition by fermentation.

The Eureka *Sentinel* reports an important discovery of tin ore in Nevada, in the following characteristic language. "A leading scientist of this section is confident that he has discovered a world of tin ore within 25 miles of Eureka. At present we are not at liberty to give particulars, further than to make the simple announcement of the fact. The gentleman in question has prospected for tin all through Montana, Idaho, Oregon, and California, and therefore is pretty well posted on the subject. He says that in one place in Idaho he found strong indications, but the thing would not pan out satisfactorily. The great importance of the discovery, even though the sanguine expectations of our informant should not be more than half realized, is readily inferred from the fact that the United States government has offered a standing bonus of \$1,000,000 for the first paying tin mine discovered in America. (?) Our informant feels certain that he will bag that million, realize in addition thereto a sum adequate to the purchase of a kingdom, and make Eureka the wealthiest and most noted mining center on the face of the globe. We shall give full particulars just as soon as we get permission from the discoverer to do so. In fact, it is a very close shave if we have not committed a breach of confidence in giving to the public the foregoing." What form of expression the *Sentinel* will employ when it shall publish the "full particulars" is an interesting subject for speculation.

Mr. A. Hartup, of Pittsburgh, has taken a contract to build two

IRON STEAMERS FOR THE SOUTH AMERICAN COASTING TRADE.

which are spoken of by the *Commercial*, of that city, as follows: One of these boats will be a sidewheel steamer, 120 ft. long, 26 ft. beam, and five feet depth of hold. They will be furnished with Hartup's compound motor engines, the company deeming this engine preferable to all others, after an extensive and very thorough examination. Mr. Bosa, in company with Mr. B. C. Coffin and another member of the company, visited England for the purpose of inspecting their machinery, and after their arrival in this country examined our boats and machinery both East and West. The result of their investigations is, that the Hartup engine is the best for boats, and takes less fuel than any other which they had examined. This is a very high compliment to a Pittsburgh machinist and inventor, but it is one which is prompted solely by the self-interest of the company who propose to spend their money here. They come here simply because they believe they can get better machinery and better workmanship than at any other point. The compound engine, of which Mr. Hartup is the patentee, has been so thoroughly tested on our rivers as to command the indorsement of all who have used them. These boats will be fitted up here complete, and then taken apart and shipped eight thousand miles to their destination. This contract is alike creditable to Mr. Hartup and the "Iron City," with whose manufacturing interests he has been so long identified.

A Nevada exchange publishes the following description of the

PUMPING MACHINERY OF THE IMPERIAL MINE, Comstock Lode: The foundation consists of 24 feet of stone laid in cement, to which the pumping machinery is anchored by bolts having eyes turned at the bottom, through which bars of iron are passed, so that each bolt has the weight of the entire foundation, estimated at 6,000,000 pounds. The engine, 160 horse-power, has a 22 inch cylinder and a 42 inch stroke; length of walking beam, 27 feet. The weight of the engine bed, complete, is 13 tons. The engine shaft is 9 inches in diameter, and weighs 11,000 pounds. There are two pinion wheels on this shaft for driving the spur wheels; also, a reel with a 2 1/2 inch hemp cable for handling the pumps in the shaft. There are two spur wheels, each 11 feet 6 inches in diameter, 14 inch face, and weighing 20,000 pounds each. These wheels are placed 18 inches apart, and the wrist pin, to which is attached the pitman rod for working the pumps, passes through both wheels, thus insuring great steadiness and strength. The whole foundation is made of California spruce, each one of the timbers being 24 by 26 inches. This is the first pumping machinery so arranged, and from the satisfactory manner in which it appears to work, we have no doubt the plan will hereafter be universally adopted for similar work. The spur wheel shafts are 10 inches in diameter. There are six 10 inch pumps in the perpendicular shaft, and two of 9 inch in the incline shaft. The pumps are all of the kind known as "plungers." The pump rods are of timber, 13 inches square, and heavily strapped with iron. The weight of the rod is counterbalanced by four balance bobs, carrying 160,000 pounds of ballast; the chord to the main bob is 27 by 24 inches, and 30 feet in length. The pumps at present are pumping from a depth of 1700 feet, and with the present quantity of water, will require to be run not to exceed 8 hours in each 24. The capacity of this machinery is estimated to be equal to draining the mine to a depth of 3000 feet. Every portion of it is made in the best manner, and certainly it is not equalled in power or completeness by any on the Pacific coast, and, so far as we know, by none in the United States. As showing the energetic character of this machinery, we may mention that on being set to work it pumped up to the surface 22,250 gallons of water in the short space of two hours.

A combination of metals, known under the name of

ARNOLD'S ELECTRO-GALVANIC IRON, is thus described: The process by which this alloy is formed consists in adding a certain alloy, in a fused condition, to melted cast iron, the metals used to form this alloy being copper, tin, and zinc, in the proportion of about 1 lb.

each of the two former, and 3 lbs. to 5 lbs. of the latter, to every 100 lbs. of iron. A small quantity of antimony is also added for the purpose of tempering. These proportions are not imperative, but may be varied according to the quality of the iron used. It is claimed that the introduction of this alloy, together with the flux used, completely changes the nature of the iron used as to give it much the character of malleable iron. That it adds materially to its strength, producing a compound of exceedingly close grain, of a uniform texture throughout, susceptible of almost the polish and temper of steel, with an almost perfect resistance to the corroding influences of salt water and acids, has been very fully proved. Frequent experiments have been made with a view to ascertain the comparative strength of iron, with and without this alloy. The result of two trials, exhibiting the tensile strength, were as follows—one at the Morgan Iron Works, New York, November 16th, 1864:

Composition iron broke at 19,248 lbs. square inch. Without alloy " 15,443 "

Difference..... 3,805 " " " or nearly 25 per cent. in favor of the composition. The iron used in this test was a mixture of two well known brands—"Sterling" and "Irondale." Another test, giving results still more flattering for the combination, was made at the Ward Ordnance Works, Trenton, N. J., as follows: A ladle of iron was tapped from the cupola and poured into two smaller ladles, to one of which the composition, or alloy, was added. From each ladle, two pieces were cast: one set 24 inches long, 1 inch square, the other set 3 inches diameter, and several feet long; test pieces were turned from the 3 inch bars. The one containing the composition broke under a tensile strength of 18,317 lbs. square inch, and the one without composition broke at 8769 lbs., showing an excess of strength due to the "Arnold" of 9558 lbs., or 106 per cent. In this test, inferior iron was purposely used.

Railway Improvements.

BY JAMES A. WHITNEY, M. E.

It is not the purpose of this sketch either to forecast the future of railway progress, or to chronicle the improvements successively accomplished since, forty years ago, Horatio Allen moved the starting bar of the first locomotive run on American rails; but rather to mention several projects, with more or less of probable utility in them, but which have been drifted under and out of sight by the impatience of protracted experiment which, both here and abroad, is one of the most salient characteristics of railway management.

Foremost among the essentials of modern railroading is that of safety, and for this signals are imperative. I do not doubt that the system of electric signals now being introduced will add much to the safety of travel and transit, especially as applied in block signaling under ordinary conditions. But special danger signals are not less desirable, and whether it would not be well to add to them some means of stopping a train by the volition of the signal man, without necessarily the intervention of brakeman or engineer, is one well worthy of cogitation. That something of the kind would answer a good purpose was evidently held by some a quarter of a century since, for in 1848 an English patent was granted on an inclined rail section to be laid between the two rails of a track near a station, in such manner that the "pointman," or attendant, could, through the agency of a lever, lift one end of the rail, when it was desired to insure, beyond a peradventure, the stoppage of the train. The elevated end of the rail section being brought in contact with a small roller provided on a pivoted arm carried by the engine and connected with the brakes, whereby the brakes were actuated and the desired result accomplished. In the form described the apparatus was practically worthless, but it is easy to imagine means for actuating a similar device from a distance, and thereby stopping a train before, or at about, the time it arrives at a station.

The quick stoppage of trains in case of emergency has exercised the minds of hundreds of inventors, and with the means now in common use for applying steam power in their operation, there need be little trouble in "converting all the wheels into frictional retarders," sliding roughly upon the rails—ordinarily a most undesirable proceeding. But sixteen years ago railroad brakes were in the infancy of their development, and the method of working proposed by one William Hill did not then seem as ridiculous as it does now. This projector advocated nothing less than a system of ratchet wheels attached to the axles of the cars, and furnished with pawls which, when let down upon the ratchet wheels, were to lock the axles, and consequently the wheels, rigidly against rotation. The pawls during the running of the train were held out of gear by springs, and brought down, on occasion, by suitably arranged cords running the length of the train. It is needless to say that this apparatus never came into use, and it is left to the imagination, to figure the result of suddenly stopping the motion of a train at thirty or fifty miles an hour by the quick clutch of pawls on the axles; a more efficient method of making kindling wood of well made cars could scarcely be devised.

But as necessary in their place as brakes, and much less the subject of current inventive effort, are efficient buffers for cars, and I expect that a few years hence will witness the laying aside of the clumsy contrivances now in use, and the adoption of others far superior both in their practical operation and in the scientific theories of their construction. The following is a plan patented a generation ago, the utility of which is not apparent at first glance, but which, novel to experimenters in these days, might, with modifications in the mechanism, serve a good purpose. In it "the resisting power of the buffers is (was) produced by a

friction brake so combined as to effect an increasing power of resistance through the range of the stroke and producing no recoil action." The further description states that "In this arrangement the buffer rods are made to act through the medium of racks upon pinions mounted upon a shaft on which is also a friction pulley, there being passed spirally around this pulley certain friction bands, and the effect of the whole arrangement being that on the buffers being brought into action, the friction pulley is turned round inside the friction bands, which again are gradually drawn tighter upon the pulley as the buffers are driven back by the action of a cam and certain apparatus connected therewith." The devices embraced in this system of mechanism are manifestly too numerous for efficient action, but the idea of bringing a constantly increasing frictional resistance to bear without wholly stopping the retreat of the buffer rods, and without liability of sudden reaction, is not without obvious merit.

Closely akin to greater safety is the adoption of stronger and tougher axles than now obtain, and although homogeneous iron probably best fulfills all the conditions of resistance to permanent strain and intermittent vibration, there are not a few who hold, with apparent reason, that a combination of iron and steel will subserve a better purpose. Among these was John Cammell, who, in 1857, proposed the fabrication of car wheels "by inclosing a core of malleable or wrought iron of good quality within a covering of steel of any desired and suitable thickness, according to the dimensions of the article intended to be produced." A modification, so termed, of this plan, and a very poor one, consisted in placing a number of steel tubes one within another, with spaces between, and then casting in and about them cast iron or other metal; another, also of doubtful utility, consisted in winding a flat strip of wrought iron into spiral or convolute form, and then casting steel about it to form both the inner and outermost portion of the axle; in some cases, also, it was proposed to cast the steel upon a plain wrought iron core, either square or cylindrical in shape.

I have here noted only a few of the projects having reference to the subjects of invention and opportunities for improvement indicated by the titles of the several devices named. One or two may be taken as illustrative of the vagaries of projectors, but others seem to contain germs of utility which, under the active hand of future inventors, may develop into shapes of permanent usefulness.

Special Notices.

DAYTON'S (Copyrighted).
Revised Discount Bolt List.
Book form, Philadelphia and Common, 19 discounts.
Revised Discount Screw List.
On card, 13 discounts.
Mailed, in perfect order, on receipt of price.
Single copy, either list, \$1.00; two or more, 75 cents.
Address FRANK DAYTON,
83 Duane St., N. Y.

To Manufacturers.

A manufacturing firm of Staple Goods, having a Salesroom in the center of the Hardware Trade, on Chambers Street, wishes to arrange with other manufacturers for the sale of their goods.
Address "B," office of *The Iron Age*, 10 Warren Street, N. Y.

Office to Rent on Chambers Street.

A part of first loft in the most eligible block of the street.
For particulars address N.,
Office of *The Iron Age*, 10 Warren Street, N. Y.

OLD RAILS, Flange and Double Headed. Paul Strybos, Antwerp, Belgium.

R. T. HAZELL, AUCTIONEER.
By R. T. Hazell & Co.,
Store No. 118 Chambers Street.
Our REGULAR SALES OF HARDWARE, CUT LERY, FANCY GOODS, &c. will be held on TUESDAYS and FRIDAYS throughout the season.
CASH ADVANCES made on CONSIGNMENTS with out additional charge.

MANUFACTURERS

desirous of introducing their goods to the British and Continental Markets, are advised to insert advertisements in the newspaper "IRON," published every Saturday, at 99 Cannon Street, London, E. C.
SCALE: First 3 lines, 3/; every additional line, 10d. Price, 6d. per copy, or 30/ per annum, inclusive of postage to the United States.

STERLING IRON & RAILWAY CO. MAKERS OF STERLING ANTHRACITE PIG IRON FOR FORGE AND FOUNDRY USE.

A. W. HUMPHREYS, Treas.,
42, PINE ST., N. Y.

Translations and Condensations.

The undersigned, commercial Editor of *El Cronista*, the Spanish Government paper in this city, and Foreign Editor and Translator of the *Daily Bulletin*, has made it a specialty for years past to translate industrial matter, with the strictest adherence to the technical wording, from and into English, German, Spanish and French, for manufacturers, patentees and others, and begs to be recommended to the iron masters and trade in that capacity.
C. KIRCHHOFF, Box 2866, Post Office.
Latest Publications translated by C. Kirchhoff.
German Imperial Consular Instructions. "Cubany becomes independent." Officially endorsed by the governments of Germany and Spain.

Special Notices.

Wanted.

Traveling agent to sell small line of Hardware on commission. Will not interfere with sale of other goods. Address Q. S., office of *The Iron Age*, 10 Warren Street, N. Y.

A party with long experience and with means wishes to associate himself with an established Wholesale Hardware House, in this city. Undoubted reference given, and all communications held strictly confidential. Address S. T., Office of *The Iron Age*, 10 Warren St., N. Y.

Wanted---Corrugating Machine

For corrugating Galvanized Sheet Iron of all sizes Send price and description of machine.

Also, Wanted,

Set of Reels for winding wire from Galvanizing Pot. Address Corrugating Machine, Office of *The Iron Age*, 10 Warren St., N. Y.

To Hardware Manufacturers.

A house dealing in Foreign Hardware, of nearly 40 years' standing, whose trade is with Hardware Jobbers throughout the United States, is desirous of securing the agencies of American Manufacturers of leading goods of large sale. To parties who want a Depot in New York, and a house to represent them with large and desirable connections, this is a good opportunity. Address HARDWARE, Box 3962, New York P. O.

To Furnace Men and Malleable Iron Manufacturers.

For Sale or to Let, The McHaffie Steel Co.'s Works, at Lamokin, on the P. W. & B. Railroad, at its junction with the Baltimore Central, comprising Foundry, Annealing Furnaces, Machine, Blacksmiths' and Carpenters' Shops, &c. These Works are most eligibly located, and with ample facilities for doing a large business. Parties desiring such property are requested to apply in person at the Works, or by letter addressed to "The McHaffie Steel Co.," Chester, Delaware Co., Pa.

"ENGINEERING,"

A Weekly Illustrated Journal, edited by W. H. MAW and JAMES DREDGE.

OFFICES, 37 Bedford St., Strand, London, W. C.
52 Broadway, New York.

CEO. ED. HARDING, C. E.,

Representative in United States.

This successful English Engineering Journal, containing thirty-six pages, weekly, illustrating the latest advances in Civil, Mechanical, Mining and Military Engineering Science, both in Europe and America, can now be obtained by American subscribers, post paid, for \$2.50, currency, per year, sent to the New York office of the Journal.
All the important details of the buildings and novel machinery at the great Vienna Exposition will be illustrated and described in *Engineering* the current year; and this, with illustrations of all the larger American engineering structures, will render it invaluable to every American Engineer, Architect, Iron Master and Machinist.
The best medium for advertising American Machinery to the attention of European capitalists.
Send for specimen copy, free.

CIRCULARS

addressed to reach the

HARDWARE

and other lines of trade throughout the UNITED STATES.

Names of parties in various business selected with a view to their Mercantile Standing.

ALSO PUBLISH

Trade Registers

OF
Hardware and Kindred Interests,
MACHINERY
and Kindred Interests.

Very desirable advertising mediums to all interested in these trades.

The Merchants & Man'rs Agency,

4 Warren St., N. Y., Publishers.

NOTICE.

Our only authorized Agents to collect money for any thing connected with our publications will invariably be provided with a letter of authority, specifying the particular object for which it is given, and bearing our official seal, and signed by the Manager.

The Merchants and Manufacturers Agency,
4 Warren Street, N. Y.

The Journal of the Iron and Steel Institute.

Containing Proceedings of the Institute; Original Communications bearing upon matters connected with the Iron and Steel Trades; Reports on the progress of the Iron and Steel Industries in foreign parts, by the Foreign Secretary (Mr. David Forbes, F. R. S.); Notes on the British Iron and Steel Trades; Statistical Information, &c., &c. Can be obtained from the publishers, Messrs. E. & F. N. SPON, Chancery Cross, London. Price, 5/ each number. Nine numbers have been issued, and all except Number 1 (1871), which is out of print, can be supplied. The next number of the Journal will be published in a short time.

JNO. JONES, General Secretary.
ROYAL EXCHANGE, Middlesborough, May 22, 1873.

Manufacturers of PATENT ARTICLES

which are of real merit, and sold to

Hardware or Tin and Stove
Dealers,

can make arrangements with a man who knows how to sell them, by addressing

Charles Gooch,

Cincinnati, Ohio.

NOW READY.

"The Net Discounted Bolt List," PRINTED ON A CARD.

15 Discounts (from 25 to 70), warranted correct. Price 75 cents each. Address

KINGLEY BROS.,
119 Franklin Street, Buffalo, N. Y.

Special Notices.

IF YOU WANT

to make your sales for

Hay, Straw and Stalk Cutters
ten times larger than ever before, get the
Copper Strip Junior.
Circulars free.

WARREN GALE, Chicopee Falls, Mass.

To INVENTORS AND MANUFACTURERS

The Managers of the 42d Exhibition of the American Institute, of the City of New York, beg to announce, that the Exhibition Buildings on 2d and 3d Avenues and 63d and 64th Streets, will be open for the reception of heavy Machinery August 15th and for other articles, September 1st 1873. The Exhibition will be formally opened September 10th.
For particulars, address "General Superintendent, American Institute, New York."

For Sale, &c.

100 Horse Power Horizontal High Pressure Engine For Sale.

Built on heavy Cast Iron Bed, 26 ft. long, 3 1/2 ft. wide; Cylinder 18 in. diameter, 4 ft. stroke; Crank Shaft, best hammered Wrought Iron; Fly Wheel, 15 tons weight, 17 ft. diameter, 25 in. face, turned true for belt; Judson's Patent Governor. Whole affair substantial, and suited for a rolling mill or other heavy work. Has been but little used, and will be sold for about half its cost. Wm. E. Tanner & Co.,
Richmond, Va.

For Sale.

One Hundred Tons Extra Strong Cast Iron, Cannon Stock, broken up for the Cupola. Fifteen per cent. of this stock to the charge makes strong, sound Castings. In lots to suit. Apply to CHARLES HUBBARD, Jr.,
60 Vesey Street, N. Y.

Office hours between 1 and 2 o'clock, P. M.

HARDWARE STORE

For Sale.

We offer our stock and fixtures on good terms. We have a well established, large and paying business—sales last year nearly \$300,000.

THOS. MILLER & CO., Burlington, Iowa.

Valuable Iron Works, For Sale.

The undersigned offers for sale the Iron Works in Pottsville, Schuylkill County, Pa., known as "The Washington Works," consisting of a

Large Stone Machine Shop & Foundry,
Brick Pattern House, Erecting Shop,
Stone Blacksmith Shop, Brick Office, and
Lot of Ground containing in front 195 feet
3 inches, and in depth 260 feet.

There will be sold with the above a large and valuable collection of Patterns, Heavy Crane Flasks and Heavy Core Spindles for making heavy Castings and Pipes of all sizes; Turning and Planing Tools. The Works can be put in immediate operation. A favorable opportunity is here presented for enterprising men. The demand for Castings and Machinery is constantly increasing in this region. The property will be sold on liberal terms. If not sold in a reasonable time it will be for Rent.
For particulars apply to
J. W. ROSEBERRY, Trustee,
Pottsville, Pa.

Rolling Mills For Sale or Lease.

The "CALVERT ROLLING MILLS," situated in the city of Baltimore, were withdrawn from the sale advertised on the 16th of May, and are now offered at private sale, or will be leased to responsible parties. The terms will be made advantageous. The Mills are in perfect order, and can be put in operation at short notice.
For full information address
ALEX. BROWN & SONS, BALTIMORE.

For Sale or To Lease.

A new Foundry, situated in Peekskill, Westchester Co., N. Y., with a good water front.

Terms easy. Inquire of
A. H. FREE,
Peekskill, N. Y.

For Sale or To Let.

The Stove Foundry lately occupied by Munsel & Thompson, situated at Elizabethport, N. J., can be adapted to any manufacturing purpose, having coal and iron within one block, direct from the mines. Communication with New York 22 times a day by rail, and 4 times by steamboat. Within half a block of the river. Will be let for one or more terms of years. Apply to address
A. HAZEL & CO.,
32 Broadway, N. Y.

Rolling Mill Machinery For Sale

One train, 3 high, finishing rolls, with steam engine 75 H. P.; and balance wheel, 20,000 lbs.—complete and in good order—by

Fearing, Rodman & Swift,
23 & 25 Commercial Street, Boston.
BOSTON, NOV., 30, 1873.

Patent Right For Sale.

The undersigned desires to dispose of his patent for Feed Water Heater; or would sell State Rights for same, or the right to manufacture under a royalty. Address GEO. WALES,
Brooklyn Brass and Copper Mills,
Brooklyn, N. Y.

Hardware Store For Sale.

Stock consists of a well assorted stock of Shelf and Heavy Hardware, Iron, Wagon Timber, Stoves and Tinware, in the best Country Town in Western Mo. Other more important business the reason for selling. Will sell store if wanted. Address
C. L., office of *The Iron Age*, 10 Warren St., N. Y.

In manufactured Iron, Steel, Tin Plate, Copper, Lead, etc., complaint of dull times, slack trade, etc. Assortments are, however, quite complete. 50 tons Glengarnock Pig Iron, ex Golden Gate, sold at \$85 per ton. At auction, 10,000 lbs. Old Yellow sold at 14c. cash. Various other lots of yellow sold at 12c. to 13.75¢. The market continues to do well supplied with Boonton mills and other standard brands. We quote invoice parcels, ex ship, at \$7-37½. The trade price remains unchanged—\$6-75 for 100; 60; 50; and 40 pounds per kesterive as follows: 100 lb. do. 10d.; 90 lb. do. 10d.; 80 lb. do. 10d.; 70 lb. do. 10d.; 60 lb. do. 10d.; 50 lb. do. 10d.; 40 lb. do. 10d.; 30 lb. do. 10d.; 20 lb. do. 10d.; 10 lb. do. 10d.; 5 lb. do. 10d.; 2½ lb. do. 10d.; 1¼ lb. do. 10d.; Cut spikes all sizes \$1-35, above 100 lb. Thus the jobbers' prices are:

BOSTON.

JUNE 14.—The Boston Iron market remains quiet for Refined Bar, which can be bought better than regular prices, sizes being basic, but below \$100 per ton, though some \$100 a lb is the ruling price from store for sizes which are plenty. Assortments are broken, however, and some sizes which are scarce are bringing higher prices. The demand for Pig Iron, in more quantities this week, but the improvement may or may not be maintained. Prices are steady, and our quotations are unchanged. We quote yard lots of American Pig Iron at: #22 to #26 per ton, including No. 2 extra at \$50 to \$58, and No. 1 at \$52 to \$60. Cast Iron, including #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13, #14, #15, #16, #17, #18, #19, #20, #21, #22, #23, #24, #25, #26, #27, #28, #29, #30, #31, #32, #33, #34, #35, #36, #37, #38, #39, #40, #41, #42, #43, #44, #45, #46, #47, #48, #49, #50, #51, #52, #53, #54, #55, #56, #57, #58, #59, #60, #61, #62, #63, #64, #65, #66, #67, #68, #69, #70, #71, #72, #73, #74, #75, #76, #77, #78, #79, #80, #81, #82, #83, #84, #85, #86, #87, #88, #89, #90, #91, #92, #93, #94, #95, #96, #97, #98, #99, #100, #101, #102, #103, #104, #105, #106, #107, #108, #109, #110, #111, #112, #113, #114, #115, #116, #117, #118, #119, #120, #121, #122, #123, #124, #125, #126, #127, #128, #129, #130, #131, #132, #133, #134, #135, #136, #137, #138, #139, #140, #141, #142, #143, #144, #145, #146, #147, #148, #149, #150, #151, #152, #153, #154, #155, #156, #157, #158, #159, #160, #161, #162, #163, #164, #165, #166, #167, #168, #169, #170, #171, #172, #173, #174, #175, #176, #177, #178, #179, #180, #181, #182, #183, #184, #185, #186, #187, #188, #189, #190, #191, #192, #193, #194, #195, #196, #197, #198, #199, #200, #201, #202, #203, #204, #205, #206, #207, #208, #209, #210, #211, #212, #213, #214, #215, #216, #217, #218, #219, #220, #221, #222, #223, #224, #225, #226, #227, #228, #229, #230, #231, #232, #233, #234, #235, #236, #237, #238, #239, #240, #241, #242, #243, #244, #245, #246, #247, #248, #249, #250, #251, #252, #253, #254, #255, #256, #257, #258, #259, #260, #261, #262, #263, #264, #265, #266, #267, #268, #269, #270, #271, #272, #273, #274, #275, #276, #277, #278, #279, #280, #281, #282, #283, #284, #285, #286, #287, #288, #289, #290, #291, #292, #293, #294, #295, #296, #297, #298, #299, #300, #301, #302, #303, #304, #305, #306, #307, #308, #309, #310, #311, #312, #313, #314, #315, #316, #317, #318, #319, #320, #321, #322, #323, #324, #325, #326, #327, #328, #329, #330, #331, #332, #333, #334, #335, #336, #337, #338, #339, #340, #341, #342, #343, #344, #345, #346, #347, #348, #349, #350, #351, #352, #353, #354, #355, #356, #357, #358, #359, #360, #361, #362, #363, #364, #365, #366, #367, #368, #369, #370, #371, #372, #373, #374, #375, #376, #377, #378, #379, #380, #381, #382, #383, #384, #385, #386, #387, #388, #389, #390, #391, #392, #393, #394, #395, #396, #397, #398, #399, #400, #401, #402, #403, #404, #405, #406, #407, #408, #409, #410, #411, #412, #413, #414, #415, #416, #417, #418, #419, #420, #421, #422, #423, #424, #425, #426, #427, #428, #429, #430, #431, #432, #433, #434, #435, #436, #437, #438, #439, #440, #441, #442, #443, #444, #445, #446, #447, #448, #449, #450, #451, #452, #453, #454, #455, #456, #457, #458, #459, #460, #461, #462, #463, #464, #465, #466, #467, #468, #469, #470, #471, #472, #473, #474, #475, #476, #477, #478, #479, #480, #481, #482, #483, #484, #485, #486, #487, #488, #489, #490, #491, #492, #493, #494, #495, #496, #497, #498, #499, #500, #501, #502, #503, #504, #505, #506, #507, #508, #509, #510, #511, #512, #513, #514, #515, #516, #517, #518, #519, #520, #521, #522, #523, #524, #525, #526, #527, #528, #529, #530, #531, #532, #533, #534, #535, #536, #537, #538, #539, #540, #541, #542, #543, #544, #545, #546, #547, #548, #549, #550, #551, #552, #553, #554, #555, #556, #557, #558, #559, #560, #561, #562, #563, #564, #565, #566, #567, #568, #569, #570, #571, #572, #573, #574, #575, #576, #577, #578, #579, #580, #581, #582, #583, #584, #585, #586, #587, #588, #589, #590, #591, #592, #593, #594, #595, #596, #597, #598, #599, #600, #601, #602, #603, #604, #605, #606, #607, #608, #609, #610, #611, #612, #613, #614, #615, #616, #617, #618, #619, #620, #621, #622, #623, #624, #625, #626, #627, #628, #629, #630, #631, #632, #633, #634, #635, #636, #637, #638, #639, #640, #641, #642, #643, #644, #645, #646, #647, #648, #649, #650, #651, #652, #653, #654, #655, #656, #657, #658, #659, #660, #661, #662, #663, #664, #665, #666, #667, #668, #669, #670, #671, #672, #673, #674, #675, #676, #677, #678, #679, #680, #681, #682, #683, #684, #685, #686, #687, #688, #689, #690, #691, #692, #693, #694, #695, #696, #697, #698, #699, #700, #701, #702, #703, #704, #705, #706, #707, #708, #709, #710, #711, #712, #713, #714, #715, #716, #717, #718, #719, #720, #721, #722, #723, #724, #725, #726, #727, #728, #729, #730, #731, #732, #733, #734, #735, #736, #737, #738, #739, #740, #741, #742, #743, #744, #745, #746, #747, #748, #749, #750, #751, #752, #753, #754, #755, #756, #757, #758, #759, #760, #761, #762, #763, #764, #765, #766, #767, #768, #769, #770, #771, #772, #773, #774, #775, #776, #777, #778, #779, #780, #781, #782, #783, #784, #785, #786, #787, #788, #789, #790, #791, #792, #793, #794, #795, #796, #797, #798, #799, #800, #801, #802, #803, #804, #805, #806

CINCINNATI.
Messrs. ADDY, HULL & Co., under date of June 16, write us as follows: Market dull, and prices a shade easier for Hot Blast Foundry Metal, with a light demand. Car Wheel Iron in fair demand and prices unchanged.

HOT BLAST CHARCOAL			
Hanging Rock No. 1.	1	ton.	\$52.00 @ 53.00 4 mos.
" " No. 2.	"	"	48.00 @ 50.00 4 mos.
Tennessee No. 1.	"	Forge	40.00 @ 41.00 4 mos.
" " Forge	"	"	50.00 @ 51.00 4 mos.
Alabama No. 1.	"	"	53.00 @ 53.00 4 mos.
Missouri No. 1.	"	"	54.00 @ 57.00 4 mos.
" " No. 2.	"	"	50.00 @ 52.00 4 mos.
HOT BLAST STONE COAL			
Missouri No. 1.	"	"	52.00 @ 53.00 4 mos.
" " Forge	"	"	39.00 @ 40.00 4 mos.
Ohio No. 1.	"	"	45.00 @ 48.00 4 mos.
" " Forge	"	"	36.00 @ 39.00 4 mos.
Scotch Pig, No. 1.	"	"	"
COLD CHARGES AND RECOAL			
Hanging Rock Char Wheel	1	ton.	\$60.00 @ 65.00 4 mos.
Missouri " "	"	"	60.00 @ 63.00 4 mos.
Kentucky " "	"	"	58.00 @ 60.00 4 mos.
Tennessee " "	"	"	58.00 @ 60.00 4 mos.
Alabama " "	"	"	60.00 @ 63.00 4 mos.
Machinery and Forge.	"	"	58.00 @ 60.00 4 mos.
Blooms.	"	"	112.00 @ 115.00 4 mos.

BALTIMORE.

Messrs. WYETH & BROTHER, Iron and Steel merchants, corner of South Charles and Lombard streets, report us the following prices, under date of June 17, 1873: Our market still remains depressed, with but little doing, and that for immediate wants. Orders are very few, and are chiefly for small orders, and from present indications this state of things is likely to last throughout the summer.

AMERICAN REFINED BARS IRON.

1 to 6 wide by $\frac{3}{4}$ to 1 thick.....	4 1c. to 4 3c. per lb.
2 to 4 $\frac{1}{2}$ wide by $\frac{1}{2}$ to $\frac{3}{4}$ thick.....	4 1c. to 4 3c. per lb.
Round and square, ordinary sizes, from $\frac{1}{2}$ to 2 inclusive.....	4 1c. to 4 3c. "
Hoop Iron, $\frac{1}{2}$ wide upward.....	5 1c. to 6 c. per lb.
Band Iron, from $\frac{1}{2}$ to 4 in. wide.....	5 1c. to 5 3c. "
Heavy Horse Iron $\frac{1}{2}$ to 1 wide by $\frac{3}{4}$ to 1 thick.....	5 1c. to 5 3c. "
Norway Nail Rods.....	8c. to 8 1c. "
Black Diamond Cast Steel, Flats, Squares and Octagon, ordinary sizes.....	17c. "
Michigan Cast Steel.....	18c. "
Cast Spring Steel.....	18c. "
Homogeneous Steel Plate.....	13c. "
Perkins' Horse Shoes, per keg of 100 lbs.....	\$6 37 1/2
10 9 8 7 6 5 4 3 2 1	1 37 1/2
Common Horse Nails, from 1 1/2 to 1 3/4 in. round.....	
Putnam Horse Nails, 23s 24s 25s 26s 28c. per lb.	

FOREIGN.
GREAT BRITAIN.
Messrs. J. Berger Spence & Co., London, Glasgow
and Manchester, send a list of Messrs. J. Berger Spence & Co.

Malakoff, under date of May 31, 1873, report: "There is not much animation in this market. The buyers are not anxious to purchase, and are inclined to pressing wants. In Scotch Pig from a slight decline has taken place in the value of Warran's. The shipments for the past week amounted to 17,173 tons, and the business in the corresponding week of 1872. An arrangement has been made in the Scotch district by which, in referring the dispute between the mine owners and their men to arbitration, it is hoped the matter may be finally and amicably settled. The prices for the Scotch district are not so depressed as they are and are relatively higher than those required by the Scotch (Ayrshire) makers. For Manufactured from the demand is slack, and underselling has been resorted to by the Scotch district smelters. The following news per cable from Chili that the market for the last half of April amounted to 2900 tons (consisting of 1300 tons Bars and 1600 tons Ores and Regules), had a very depressing effect on the value of Copper in this market. The price of the Scotch district is the former tone prevailed. The stock on the coast is reported as 4300 tons. English Copper is dull, and Manufactured is offered considerably under smelters' list. The price of the Scotch district is 25s. 6d. per ton, high Ingot is now quoted at 21s. 5d. there is, so much

doing in Stuts. For Lead the demand continues good, and prices are very firm with an upward tendency. There is no alteration in the rates for Spelter and a fair consumptive business is being done; a lot of hard Spelter sold during the week at £15.

IRON.—'Aysesome' Yorkshire Pig Iron, No. 1, 134/6; No. 2, 134/6; No. 3, 132/6; No. 4 (Foundry), 131/6; No. 5 (Forge), 131/6.

COAL.—Scotch W. coal, 113/ to 114/4; Newcastle, 111/ to 110/6; Scotch W. coal, 113/ to 114/4; Staffordshire Bar, 110/ to 111/6. H. cop. iron, £15, 10/ to £16. Gas Tubes, 40 per cent. off new list. Bolts, 10s. 10 per cent. premium.

COPPER.—English Tough Ingot, £94 to £96. Child

BARS, £28 to £28.
 TIN.—English Ingots, £135 to £137. Straits, £134 to £135.
 TIN PLATES.—Best Coke, I. C., 34/ to 39/; Charcoal I. C., 42/ to 44/ per box.
 LEAD.—Best English Soft Pig, £28. 15/ to £28.
 Reduced Red Lead, £25 to £27.
 ANTIMONY.—French Star, £63.
 SPLICER.—Silesian, special brands, £27. 10/ to £28.
 English, best brands, £27. 10/ to £28.

GERMANY.
(Bourse-Halle.)

HAMBURG, May 30, 1873.—*Metals.*—Lead remains firm, although there is little doing. German, 24½ to 25½; English, 23 to 26; and Spanish, 26½. Copper is dull, as heretofore. Northern sorts at 97 to 104 marks. Tin only moves off in retail way, Banca at 1 65, English at 1 60, and rods at 1 62½. *Spelter* without transactions of moment, but nevertheless well sustained at 27½.

FRANCE.

(*Messenger de Paris.*)

PARIS, May 31, 1873.—The board of directors of the Vieille Montagne spelter mines and smelting works, on the 30th ult. submitted their report for 1872 at a meeting of shareholders, showing that the

mines have produced less, but a higher value has compensated for such decrease. The company is endeavoring to make new arrangements for procuring additional ore abroad. The cost of production has been greatly increased by the rise in coal and in wages. This tendency has remained unaltered, and it is to be hoped for the future that such factors may not get worse. The net earnings of the company have been 2,512,000 francs. This amount has been distributed as follows: Toward the sinking fund, 879,000 francs; to the board of managers

and agents, 119,800; to the director general and his secretaries, 20,860; 10 francs dividend on 113,550 tenths shares, 1,125,000, and balance to new account, 665,650 francs.

(Le Commerce.)

PARIS, JUNE 5, 1873.—From There is an unbroken

duillness in the French markets. Purchasers do not find rates low enough yet, and the political status is not calculated to stimulate them. Producers, for reasons heretofore given, have undertaken no further modification of price lists. The official statements of imports of iron ore into Belgium have just been published, showing a decreasing trend for the first quarter of 1973, as follows: 1971, 321,384 tons; 1972, 198,789 tons; and 1973, 168,759 tons. During the twelve months of 1971 the imports were 504,406, and of 1972, 706,916. The difference for the first three months of 1973 is due altogether to absorption of iron ore by Germany. The Cast and Wrought Iron move-

The steam hammer recently purchased of the Bristol Forge Co., by the Catawauqua Manufacturing Co., and erected in their mill at Fern Dale, has been placed in successful operation, and is being daily used in the manufacture of bar iron. It was constructed by Samuel Merrick & Sons, at the Southwark Foundry, Philadelphia, and is what is known as a five-ton steam hammer. It was removed from the Bristol Works by a force of workmen, under the direction of Mr. Philip Storm, and erected in the Fern Dale Mill under Mr. Edward Edwards' supervision. Hammers of similar size are not in general use, but one in Pittsburgh has been in constant use for years, and determined the company to purchase this machine. The diameter of the cylinder is 24 inches, with a stroke of 43 inches. The height from the ground line to the top of the cylinder is 23 feet. Between the standards or legs of hammer is 11 feet, with a clear height of 6 feet for forging purposes. The weight of the falling mass is six tons. By admitting the steam on the top of the piston the velocity of the falling mass can be accelerated to more than double that due to gravity, and this hammer has the capacity of striking about a 31-ton blow. The excavation for the foundation is 22 feet square by 23 feet deep. A 2 feet layer of concrete was first placed, upon which is built the side walls or standard supports, which are 19 feet high and 5 feet thick; finished on top with one layer of white oak, into which the bottom plate for standard is bedded, and all firmly bolted to foundation by sixteen 3½ inch bolts. The end or binding walls are 20 feet high, and 4 feet thick. The center column of solid masonry for the anvil block is 10 feet square and 11 feet high. On top of the masonry are placed layers of white oak, each layer 12 inches thick. The anvil column is constructed independent of the standard and end walls, with a space of 6 inches between, which is packed with hosh cinder to deaden surge of blow. The foundation contains about 450 tons of stone, 4500 feet of white oak lumber. Upon the massive foundation is erected the machine, rising to the height of 23 feet. The man in charge of the steam valve stands upon an iron platform about 10 feet above the anvil, and each blow of the hammer is under his control. Upon a puddle ball being placed on the anvil, the hammer descends with a slight pressure, and as the mass takes shape the force of the stroke is increased, until the bloom is properly worked. One man maneuvers the iron, turning it so as to give the ball shape. The hammer works admirably, and it will amply repay any one to witness its movements. The irons designed to be manufactured are of large dimensions, a demand the company were not able to fill. This is the largest hammer in use in the Lehigh Valley, smaller ones being worked at Allentown, Packer-ton, and other points, but only being used as helps to blacksmith and machine shops.

THE ARCTIC FREEZER.

SIMPLEST.



QUICKEST.

BEST.

Send for Price List.

E. S. & J. TORREY,

166 Fulton Street, New York,

THE DIAMOND.

THE LATEST INVENTION.



SELF FEEDING, BASE BURNING

COAL STOVE!

With Solid Iron Fire Pot.

With Illuminated Anti-Clinker Opening.

With Patent Double Grate.

With Center Dump.

With Large Return Flues.

Takes the Lead of the Entire Family of Base Burners.

FOUR SIZES, Nos. 18, 23, 28, and 34.

MANUFACTURED BY

JEWETT & ROOT, Buffalo. JEWETT & ROOT, Chicago.
JEWETT & ROOT, Detroit. JEWETT & ROOT, Milwaukee.

Send for Catalogue and Prices.

The Swift Mill.

Established in 1845.



Letter "B" Geared Counter Coffee or Spice Mill.

Stands nearly 2½ feet high. Is highly finished, colors deep Vermilion and Gold. We make more than 20 different styles and sizes.

Send for catalogue. Manufactured exclusively by
LANE BROTHERS,
Millbrook, N. Y.

Water Filter.



A perfect success, accomplishing results never claimed for any Filter ever before invented. This Filter is now the acknowledged Standard all over the United States and Canada.

Send for Circular.

MANUFACTURED ONLY BY

JNO. C. JEWETT & SONS,
BUFFALO, N. Y.

ALFRED FIELD & CO., Foreign Hardware Commission Merchants.

PRINCIPAL OFFICES,

Birmingham, England, Nos. 66 & 67 Parade.

Sheffield, England, No. 23 Westfield Terrace.

New York, U. S., Nos. 47 John and 5 Dutch St.

BRANCH OFFICES,

Philadelphia, Cincinnati, New Orleans and Montreal.

Shipping Office,

Middletown Building, No. 1 Rumbold St., Liverpool.

VAN WART, SON & CO.

Hardware Commission Merchants,

BIRMINGHAM, - ENGLAND

AGENTS

VAN WART & MCCOY,

43 Chambers Street, New York.

GEORGE H. GRAY & DANFORTH,

48 India Street, Boston.

F. W. TILTON,

17 Old Levee Street, New Orleans.

At each of these places a complete assortment of samples of Hardware and Fancy Goods will be found, including all new descriptions. Sole Agents for the
John Himmer & Son's Celebrated
Harness and other Needles.

OSCAR IRVING VAN WART & Co.,
FORWARDING AGENTS,
2 South John Street, LIVERPOOL

SCHOLEFIELD GOODMAN & SON

(Formerly JOSHUA SCHOLEFIELD & SONS.)

GENERAL

Hardware Merchants,

BIRMINGHAM, - ENGLAND.

Agents and Sample Rooms.

New York—Edward Frith, 16 Cliff Street.
Boston—H. L. Richards, 15 Batterymarch Street.

New Orleans—R. Rhodes, 71 Camp Street.
Montreal—J. J. Evans 14 St., John Street.



Four Sizes. Coal or Wood
Shaking and Dumping Grate,
and Swing Top.

WM. RESOR & CO., Cincinnati,
Manufacturers of the renowned Cooking Stoves, FASHION, for wood, and MONTOR, for coal and wood, and the greatest variety of Coal and Wood Heating and Cooking Stoves. A large stock constantly on hand, and all orders filled promptly. (Send for Catalogue and Price List.)

SWISS

Made from pure

Very Musical.

One of these Bells
ordinary Hand Bell can
is more pleasing to
This cut represents
smallest Bell, and are
Silver Plated or Nickel

Send for

TAYLOR
NEW BRITAIN,

BELL,

SWISS METAL.

Very Pretty.

half the size of an or-
be heard further, and
the ear.
the full size of the
made either Polished,
Plated.

Price List.

MFG. CO.
CONNECTICUT,



Exclusive

TRADE MARK

SWISS BELL

Manufacturers.

SMITH, BURNS & CO.,

Manufacturers of

Galvanized and Japanned Sheet Iron Goods and Tin Ware.



Coal Hods. Patent Stamped Corrugated Riveted Bottom.

Fry Pans. "Excelsior" Polished.

Excelsior Boller. Best and Cheapest in the market.

Combined Chamber and Commode Pail,

Ash Cans, Galvanized and Japanned,

Galvanized Water Pails, Well Buckets,

Chamber Pails, Tea Kettles, &c., &c.

Toilet Sets. Fancy and Grained.

Chamber Pails, Slop Pails, Foot Tubs, Baths, Water

Carriers, Coolers, &c., &c.

Stamped and Piece Dish Pans and Plain Tin Ware.

Send for Illustrated Catalogue.

Warehouse, 45 Cliff Street, between Beekman and Fulton Streets, NEW YORK.

The Improved Patent Universal Angular and Ratchet Drilling Machine,

Adjustable to any angle, and easily carried to any part of the shop for making Repairs.

Over 4000 of these machines are now in use, and the demand is steadily increasing. Dealers will find them of ready sale and at satisfactory profits. These machines were formerly sold by Messrs. Holland & Cody, and Duryea & Kelley, but since the Miller's Falls Co. purchased the patent and began to make them exclusively in their own shops, the quality and finish has much improved, and they are now really desirable goods. These Drilling Machines are for sale in most of the larger cities at our regular prices, but where they are not so kept we will supply them on demand.

No. 1, weight 26 lb., Drill $\frac{3}{8}$ in. hole.....	Price, \$24.00
No. 2, " 52 lb., " 1 "	" 34.00
No. 3, " 106 lb., " 1 $\frac{1}{2}$ "	" 65.00

With usual trade discount.

MILLERS FALLS CO.,

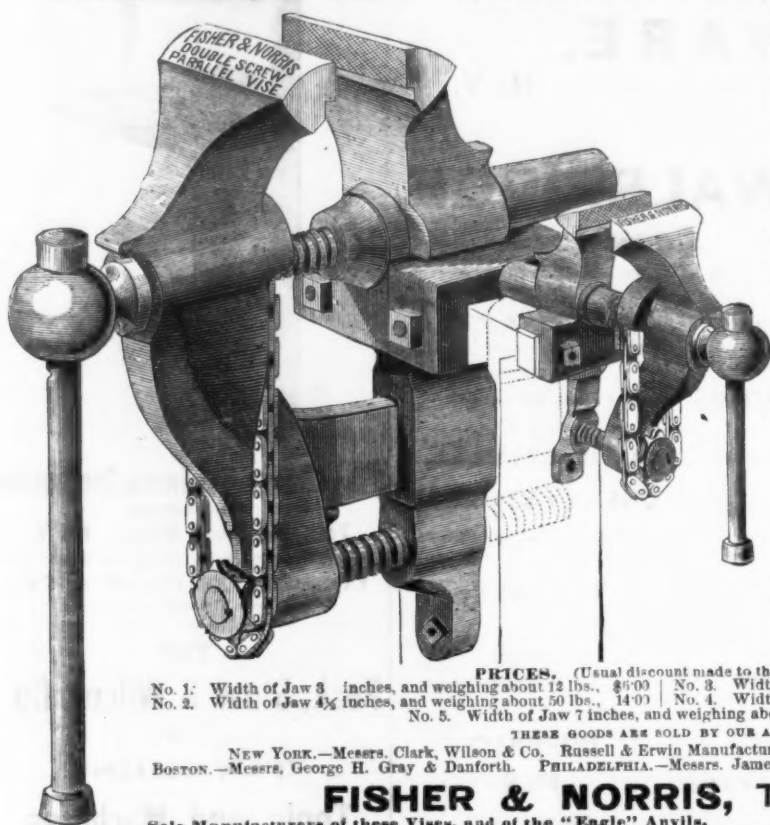
78 Beekman Street, New York.

Factory at Millers Falls, Mass.

ALSO MANUFACTURE

Barber's Bit Braces and Parallel Vises.

THE DOUBLE SCREW PARALLEL VISE.



More than twenty-five years' use of this Vise by Machinists, Tool Makers, Locomotive Shops, &c., has established its superiority over every other.

It is the only one which has all the strength and "grip" of the ordinary English Vise; and at the same time with the jaws parallel at every point of opening.

In all other "Parallel" Vises using only one screw, less than one-third of the power applied is effective on the work itself; beside, in those vises the large waste of power on the slide from friction and the tendency to "jam," of the lower end of the jaw, if screwed up very hard, renders them unfit for heavy work.

In this vise the jaws are kept always parallel by the lower screw moving in or out exactly with the upper, lever screw, by means of the chain connecting both; also, by their relative position two-thirds of the power applied at the lever screw is received by any piece held between the jaws—thus enabling the heaviest work ever required of a vise to be done with this.

The Screws are forged of the best refined iron, and work in solid cut thread boxes. The Jaws are faced with best Tool Steel, welded on, file cut, and properly tempered for wear.

The Chain is very carefully made of case hardened inside links and rivets, and acting only to regulate the position of the lower screw for different points of opening, has no direct strain of the work upon it; it is therefore as durable as the other parts.

Only the strongest material is used in this manufacture, and from actual experiment on the six inch jaw vise which has screws of 1 $\frac{1}{2}$ inch diameter and lever 19 inches long, it has been found that applied at the lever screw, it required to break either of the jaws, eleven and one-half tons, thus exhibiting a maximum strength far above any other vise of like size.

PRICES. (Usual discount made to the Trade.)
No. 1. Width of Jaw 3 inches, and weighing about 12 lbs., \$6.00 | No. 3. Width of Jaw 5 inches, and weighing about 80 lbs., \$18.00
No. 2. Width of Jaw 4 $\frac{1}{2}$ inches, and weighing about 50 lbs., 14.00 | No. 4. Width of Jaw 6 inches, and weighing about 125 lbs., 24.00
No. 5. Width of Jaw 7 inches, and weighing about 160 lbs., 30.00.

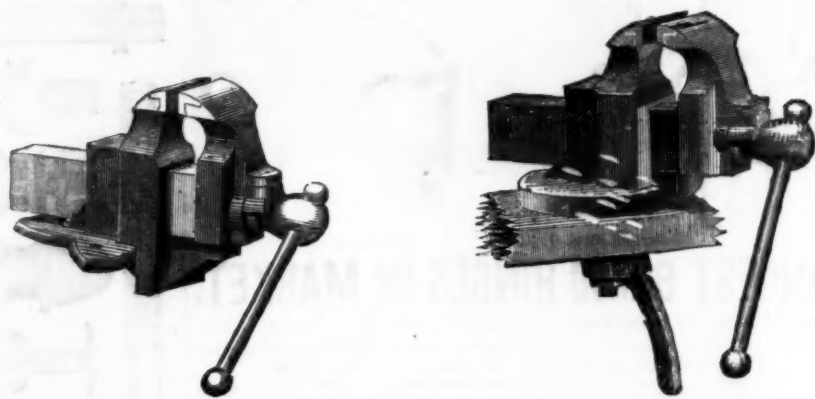
THESE GOODS ARE SOLD BY OUR AGENTS IN:
NEW YORK.—Messrs. Clark, Wilson & Co., Russell & Erwin Manufacturing Company, Messrs. Durrie & Rusher.
BOSTON.—Messrs. George H. Gray & Danforth. PHILADELPHIA.—Messrs. James C. Hand & Co. BALTIMORE.—Mr. W. H. Cole.

FISHER & NORRIS, Trenton, N. J.,

Sole Manufacturers of these Vises, and of the "Eagle" Anvils.

HOWARD

PARALLEL BENCH VISE.



Manufactured at the

HOWARD IRON WORKS,

Buffalo, N. Y.

RUSSELL & ERWIN MANUFACTURING CO.,

New York and Philadelphia, Agents.

WILSON MANUFACTURING COMPANY.
NEW LONDON, CONN.

SOLID BOX VISES.

With or without Convex and Concave Washers.

Jackscrews, Braces, Coffee Mills, Turning Lathes, Clamp Heads and Screws, Parallel Bench Vises, Sash Pullies, Ho House Pullies, Composition Cocks, Bench Screws, Vise Screws, Gridirons, Drill Stocks and Bows, Box Chisels, Rivets, Sheaves, Block Pins, Composition Roller and Iron Bushings, Riggers' Screws, Caulkers' Tools, Pump Chambers, Belaying Pins, Marlin Spikes, Malleable Iron Castings, and General Hardware.

GALVANIZING DONE TO ORDER.

WILSON MFG. COMPANY,

Warehouse 37 Chambers St., N. Y.

Schweitzer Mfg. Co.,
57 Reade St., N. Y.
IMPORTERS & JOBBERS.

Real Bronze Door Knobs, BUTTS, &c.

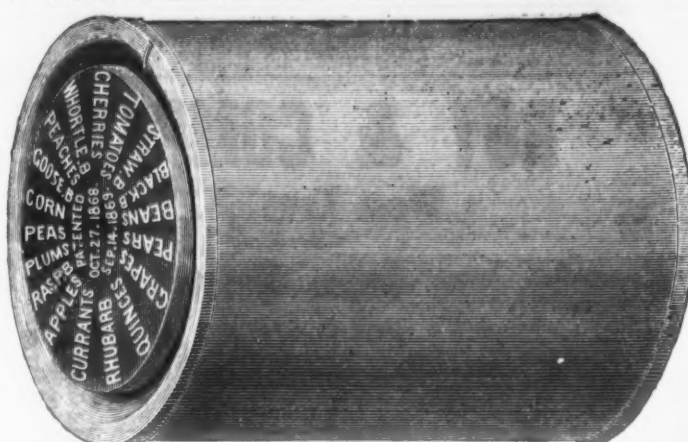
Golden Bronze Knobs

AND
HARDWARE.

Round and Hexagon inside and outside Door Knobs, and combined Escutcheon; beautiful patterns and superior finish, retaining color; Real Bronze. The list includes several SPECIALTIES—the cheapest and best bronze work offered. Bell Pulls, Sash Lifts, Shutter Bars, Sash Fasteners, Escutcheons, Bell Levers, &c.

JAMES E. HALSEY, Sole Agent,
76 READE STREET, NEW YORK.

Self Labeling Fruit Can.



We are manufacturing the Trimmings to make this very saleable can, as well as the ordinary ones. Size of cover, 3 $\frac{1}{4}$ inches. Has an unprecedented sale. Send in your orders early.

We are also making a very large line of Kitchen Furnishing Goods, in

Stamped, Japanned and Tinned Iron Ware.
Quality unsurpassed.

FRANK STURGES & CO.,

Importers and Manufacturers,

72, 74 and 76 Lake Street, CHICAGO.

J. D. FARRINGTON, Jr.,

38 Murray Street, New York.

MANUFACTURER OF

Japanned, Plain and Stamped Tin Ware, TOILET WARE a specialty,

Manufactured of IXE Tin and Ornamented in Varied and Elegant Designs.



SOLE MANUFACTURER OF THE PATENT

Self-Righting Cuspadore,

With Cast Iron Bottom, and

FOOTE'S PATENT LOCK UMBRELLA STAND

A HOME COMFORT.

Brooks' Patent Stove Board.

Letters Patent from the United States and Canada.



This really genuine improvement in Stove Boards is illustrated by the cuts; the round one being a top view of the zinc surface, polished and neatly beaded around the edge, and the oblong one shows the under finish of paper, and between that and the zinc a layer of sheet iron, which effectively protects it from being marred by the stove legs, or otherwise; and also stiffens it to lay very flat, and is a necessity to support the ornamentation.

The parts are held together by turning the edge of the zinc like a hem around the under side. They are equally desirable for Parlor or Cooking Stoves, are very compact to ship, are as cheap as plain zinc, when their durability is considered, and are the most appropriate article in market for their purpose.

21 Sizes, Round, Square and Oblong. Prices and Circulars supplied upon application. Address the manufacturers.

SIDNEY SHEPARD & CO., Buffalo, N. Y.

AGENTS.—VAN WART & McCOY, 43 Chambers Street, N. Y.; SHEPHERD & LLOYD, 405 Commerce Street, Philadelphia.

C. W. PACKER'S

P
A
T
E
N
T



ICE CREAM FREEZERS.

A large number of Testimonials might be offered in recommendation of these Freezers, but the fact that they are sold by the leading houses in all the principal cities in this country, and also numbers of them are exported every year, is a sufficient guarantee of their excellence. No expense is spared to render them perfect, and recently improvements have been introduced in their manufacture, by which increased strength, durability and neatness are secured. They are made in the most substantial manner—none but the best materials are used in their construction, and the mechanical arrangements are such that they will freeze Cream, Fruits or Water Ices in the shortest possible time.

DOUBLE-ACTION FREEZER.

SIZES AND PRICES.

10 quarts.....	\$15.00	2 quarts.....	\$5.00
12 ".....	20.00	3 ".....	7.50
15 ".....	25.00	4 ".....	10.00
20 ".....	30.00	5 ".....	12.50
25 ".....	35.00	6 quarts.....	15.00

For sale in New York at minimum rates by Wholesale Dealers in House Furnishing Goods generally.

CHAS. W. PACKER, Manufacturer, Philadelphia.

THE ARCTIC FREEZER.

SIMPLEST.



QUICKEST.

BEST.

Send for Price List.

E. S. & J. TORREY,

166 Fulton Street, New York,

THE DIAMOND.

THE LATEST INVENTION.



SELF FEEDING, BASE BURNING

COAL STOVE!

With Solid Iron Fire Pot.

With Illuminated Anti-Clinker Opening.

With Patent Double Grate.

With Center Dump.

With Large Return Flues.

Takes the Lead of the Entire Family of Base Burners.

FOUR SIZES, Nos. 18, 23, 28, and 34.

MANUFACTURED BY

JEWETT & ROOT, Buffalo.

JEWETT & ROOT, Chicago.

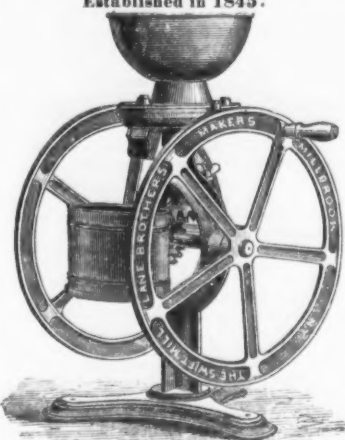
JEWETT & ROOT, Detroit.

JEWETT & ROOT, Milwaukee.

Send for Catalogue and Prices.

The Swift Mill.

Established in 1845.



Letter "B" Geared Counter Coffee or Spice Mill.

Stands nearly 2½ feet high. Is highly finished, colors deep Vermilion and Gold. We make more than 20 different styles and sizes.

Send for catalogue. Manufactured exclusively by
LANE BROTHERS,
Millbrook, N. Y.

Water Filter.

Crystal Spring.



Jewett's Patent.

A perfect success, accomplishing results never claimed for any Filter ever before invented. This Filter is now the acknowledged Standard all over the United States and Canada.

Send for Circular.

MANUFACTURED ONLY BY

JNO. C. JEWETT & SONS,
BUFFALO, N. Y.

ALFRED FIELD & CO.,

Foreign Hardware
Commission Merchants.

PRINCIPAL OFFICES.

Birmingham, England, Nos. 66 & 67 Parade.

Sheffield, England, No. 23 Westfield Terrace.

New York, U. S., Nos. 47 John and 5 Dutch St.

BRANCH OFFICES.

Philadelphia, Cincinnati, New Orleans and
Montreal.

Shipping Office.

Middleton Building, No. 1 Rumbold St.,
Liverpool.

VAN WART, SON & CO.

Hardware Commission Merchants.

BIRMINGHAM, - ENGLAND
AGENTS

VAN WART & MCCOY,

43 Chambers Street, New York.

GEORGE H. GRAY & DANFORTH.

48 India Street, Boston.

F. W. TILTON,

17 Old Levee Street, New Orleans.

At each of these places a complete assortment of samples of Hardware and Fancy Goods will be found, including all new descriptions. Sole Agents for the
**John Rimmer & Son's Celebrated
Harness and other Needles.****OSCAR IRVING VAN WART & Co.,**
FORWARDING AGENTS,
2 South John Street, LIVERPOOL.

SCHOLEFIELD GOODMAN & SON

(Formerly JOSHUA SCHOLEFIELD & SONS.)

GENERAL

Hardware Merchants,

BIRMINGHAM, - ENGLAND.

Agents and Sample Rooms.

New York—Edward Frith, 16 Cliff Street.

Boston—H. L. Richards, 18 Batterymarch Street.

New Orleans—H. Rhodes, 71 Camp Street.

Montreal—J. J. Evans 14 St., John Street.

WM. RESOR & CO., Cincinnati,
Manufacturers of the renowned Cooking Stoves, FASHION, for wood and MONITOR, for coal and wood, and the greatest variety of Coal and Wood Heating and Cooking Stoves. A large stock constantly on hand, and all orders filled promptly. (Send for Catalogue and Price List.)

Four Sizes. Coal or Wood
Shaking and Dumping Grate,
and Swing Top.

SWISS

Made from pure

Very Musical.

One of these Bells
dinary Hand Bell can
is more pleasing toThis cut represents
smallest Bell, and are
Silver Plated or Nickel

Send for

TAYLOR

NEW BRITAIN,

BELL,

SWISS METAL.

Very Pretty.

half the size of an or-
be heard further, and
the ear.the full size of the
made either Polished,
Plated.

Price List.

MFG. CO.

CONNECTICUT,



Exclusive

TRADE MARK

SWISS BELL

Manufacturers.

SMITH, BURNS & CO.,

Manufacturers of

Galvanized and Japanned Sheet Iron Goods and Tin Ware.



Coal Hods. Patent Stamped Corrugated Riveted Bottom.

Fry Pans. "Excelsior" Polished.

Excelsior Boller. Best and Cheapest in the market.

Combined Chamber and Commode Pail,

Ash Cans, Galvanized and Japanned,

Galvanized Water Pails, Well Buckets,

Chamber Pails, Tea Kettles, &c., &c.

Toilet Sets. Fancy and Grained.

Chamber Pails, Slop Pails, Foot Tubs, Baths, Water

Carriers, Coolers, &c., &c.

Stamped and Piece Dish Pans and Plain Tin Ware.

Send for Illustrated Catalogue.

Warehouse, 45 Cliff Street, between Beekman and Fulton Streets, NEW YORK.

The Improved Patent Universal Angular and Ratchet Drilling Machine,

Adjustable to any angle, and easily carried to any part of the shop for making Repairs.

Over 4000 of these machines are now in use, and the demand is steadily increasing. Dealers will find them of ready sale and at satisfactory profits. These machines were formerly sold by Messrs. Holland & Cody, and Duryea & Kelley, but since the Miller's Falls Co. purchased the patent and began to make them exclusively in their own shops, the quality and finish has much improved, and they are now really desirable goods. These Drilling Machines are for sale in most of the larger cities at our regular prices, but where they are not so kept we will supply them on demand.

No. 1, weight 26 lb., Drill $\frac{1}{2}$ in. hole.....Price, \$34.00
No. 2, " 52 lb., " 1 " " 38.00
No. 3, " 106 lb., " 1 $\frac{1}{2}$ " " 65.00
With usual trade discount.

MILLERS FALLS CO.,

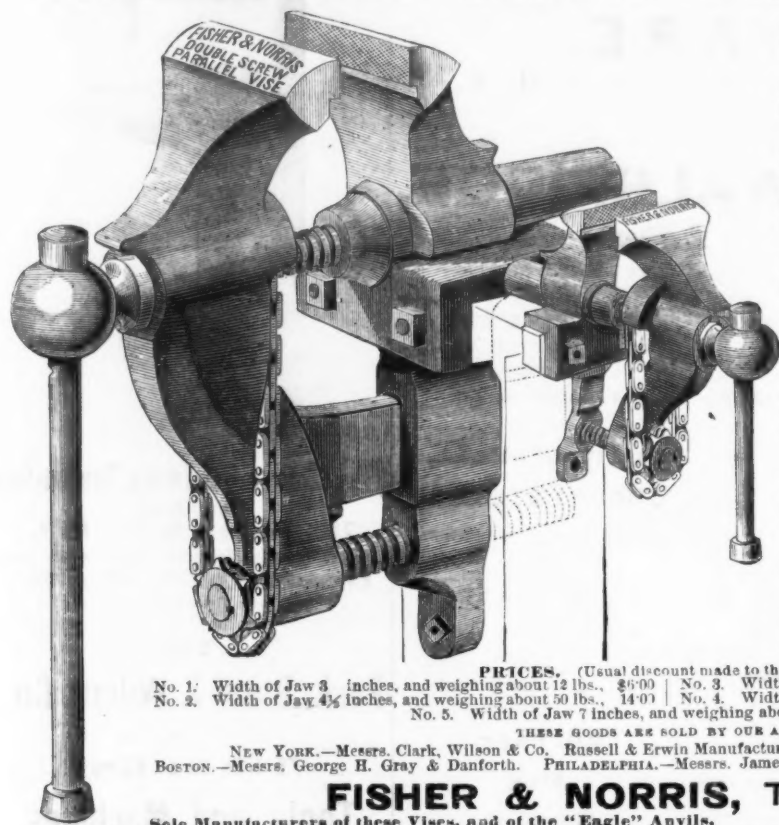
78 Beekman Street, New York.

Factory at Millers Falls, Mass.

ALSO MANUFACTURE

Barber's Bit Braces and Parallel Vises.

THE DOUBLE SCREW PARALLEL VISE.



More than twenty-five years' use of this Vise by Machinists, Tool Makers, Locomotive Shops, &c., has established its superiority over every other.

It is the only one which has all the strength and "grip" of the ordinary English Vise; and at the same time with the jaws parallel at every point of opening.

In all other "Parallel" Vises using only one screw, less than one-third of the power applied is effective on the work itself; beside, in those vises the large waste of power on the slide from friction and the tendency to "jam," of the lower end of the jaw, if screwed up very hard, renders them unfit for heavy work.

In this vise the jaws are kept always parallel by the lower screw moving in or out exactly with the upper, lever screw, by means of the chain connecting both; also, by their relative position two-thirds of the power applied at the lever screw is received by any piece held between the jaws—thus enabling the heaviest work ever required of a vise to be done with this.

The Screws are forged of the best refined iron, and work in solid cut thread boxes. The Jaws are faced with best Tool Steel, welded on, file cut, and properly tempered for wear.

The Chain is very carefully made of case hardened inside links and rivets, and acting only to regulate the position of the lower screw for different points of opening, has no direct strain of the work upon it; it is therefore as durable as the other parts.

Only the strongest material is used in this manufacture, and from actual experiment on the six inch jaw vise which has screws of 1 $\frac{1}{2}$ inch diameter and lever 19 inches long, it has been found that applied at the lever screw, it required to break either of the jaws, eleven and one-half tons, thus exhibiting a maximum strength far above any other vise of like size.

PRICES. (Usual discount made to the Trade.)
No. 1. Width of Jaw 3 inches, and weighing about 12 lbs., \$6.00 | No. 3. Width of Jaw 5 inches, and weighing about 80 lbs., \$18.00
No. 2. Width of Jaw 4 $\frac{1}{2}$ inches, and weighing about 50 lbs., 14.00 | No. 4. Width of Jaw 6 inches, and weighing about 125 lbs., 24.00
No. 5. Width of Jaw 7 inches, and weighing about 160 lbs., 30.00.

THESE GOODS ARE SOLD BY OUR AGENTS IN

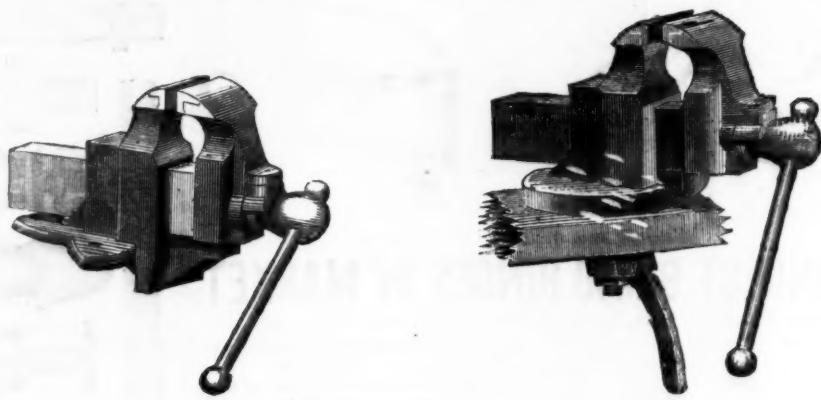
NEW YORK.—Messrs. Clark, Wilson & Co. Russell & Erwin Manufacturing Company. Messrs. Durrie & Russer.
BOSTON.—Messrs. George H. Gray & Danforth. PHILADELPHIA.—Messrs. James C. Hand & Co. BALTIMORE.—Mr. W. H. Cole.

FISHER & NORRIS, Trenton, N. J.,

Sole Manufacturers of these Vises, and of the "Eagle" Anvils.

HOWARD

PARALLEL BENCH VISE.



Manufactured at the

HOWARD IRON WORKS,

Buffalo, N. Y.

RUSSELL & ERWIN MANUFACTURING CO.,

New York and Philadelphia, Agents.

WILSON MANUFACTURING COMPANY.
NEW LONDON, CONN.

SOLID BOX VISES.

With or without Convex and Concave Washers.

Jackscrows, Braces, Coffee Mills, Turning Lathes, Clamp Heads and Screws, Parallel Bench Vises, Sash Pullies, Ho House Pullies, Composition Cocks, Bench Screws, Vise Screws, Gridirons, Drill Stocks and Bows, Box Chisels, Rivets, Sheaves, Block Pins, Composition Roller and Iron Bushings, Riggers' Screws, Caulkers' Tools, Pump Chambers, Belaying Pins, Marlin Spikes, Malleable Iron Castings, and General Hardware.

GALVANIZING DONE TO ORDER.

WILSON MFG. COMPANY,

Warehouse 37 Chambers St., N. Y.

Schweitzer Mfg. Co.,
57 Reade St., N. Y.
IMPORTERS & JOBBERS.

Real Bronze Door Knobs, BUTTS, &c.

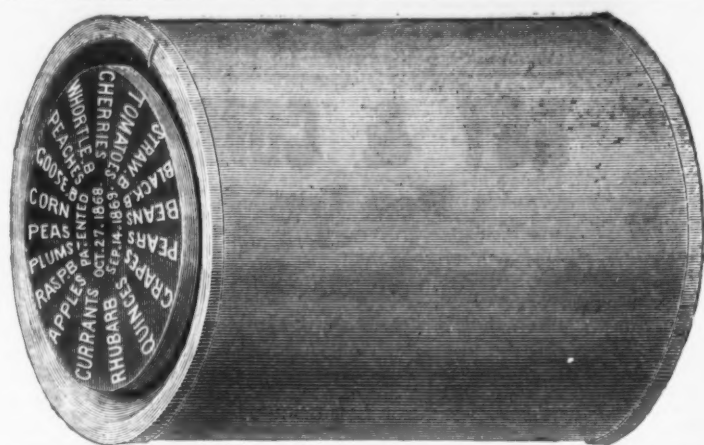
Golden Bronze Knobs

AND
HARDWARE.

Round and Hexagon inside and outside Door Knobs, and combined Escutcheons; beautiful patterns and superior finish, retaining color; Real Bronze. The list includes several SPECIALTIES—the cheapest and best bronze work offered. Bell Pulls, Sash Lifts, Shutter Bars, Sash Fasteners, Escutcheons, Bell Levers, &c.

JAMES E. HALSEY, Sole Agent,
76 READE STREET, NEW YORK.

Self Labeling Fruit Can.



We are manufacturing the Trimmings to make this very saleable can, as well as the ordinary ones. Size of cover, 3 $\frac{1}{4}$ inches. Has an unprecedented sale. Send in your orders early.

We are also making a very large line of Kitchen Furnishing Goods, in

Stamped, Japanned and Tinned Iron Ware.
Quality unsurpassed.

FRANK STURGES & CO.,

Importers and Manufacturers,

72, 74 and 76 Lake Street, CHICAGO.

J. D. FARRINGTON, Jr.,

38 Murray Street, New York.

MANUFACTURER OF

Japanned, Plain and Stamped Tin Ware, TOILET WARE a specialty,

Manufactured of IXX Tin and Ornamented in Varied and Elegant Designs.



SOLE MANUFACTURER OF THE PATENT

Self-Righting Cuspadore,

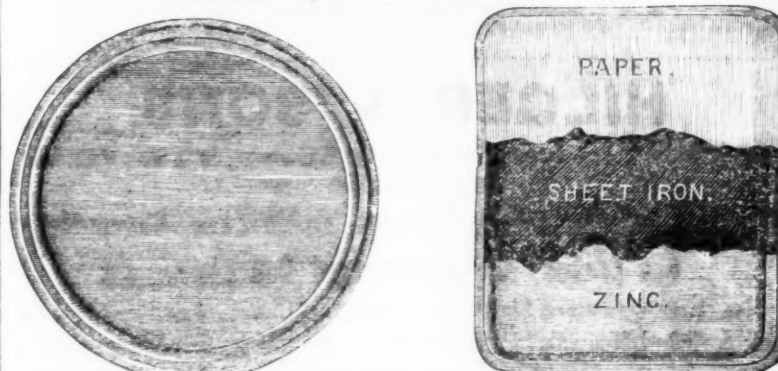
With Cast Iron Bottom, and

FOOTE'S PATENT LOCK UMBRELLA STAND

A HOME COMFORT.

Brooks' Patent Stove Board.

Letters Patent from the United States and Canada.



This really genuine improvement in Stove Boards is illustrated by the cuts: the round one being a top view of the zinc surface, polished and neatly beaded around the edge, and the oblong one shows the under finish of paper, and between that and the zinc a layer of sheet iron, which effectually protects it from being marred by the stove legs, or otherwise; and also stiffens it to lay very flat, and is a necessity to support the ornamentation.

The parts are held together by turning the edge of the zinc like a hem around the under side. They are equally desirable for Parlor or Cooking Stoves, are very compact to ship, are as cheap as plain zinc, when their durability is considered, and are the most appropriate article in market for their purpose.

21 Sizes, Round, Square and Oblong. Prices and Circulars supplied upon application. Address the manufacturers,

SIDNEY SHEPARD & CO., Buffalo, N. Y.

AGENTS.—VAN WART & McCAY, 43 Chambers Street, N. Y.; SHEPHERD & LLOYD, 405 Commerce Street, Philadelphia.

C. W. PACKER'S

PATENT



ICE CREAM FREEZERS.

A large number of Testimonials might be offered in recommendation of these Freezers, but the fact that they are sold by the leading houses in all the principal cities in this country, and also numbers of them are exported every year, is a sufficient guarantee of their excellence. No expense is spared to render them perfect, and recently improvements have been introduced in their manufacture, by which increased strength, durability and neatness are secured. They are made in the most substantial manner—none but the best materials are used in their construction, and the mechanical arrangements are such that they will freeze Cream, Fruits or Water Ices in the shortest possible time.

DOUBLE-ACTION FREEZER.

SIZES AND PRICES.

10 quarts.....	\$15.00	2 quarts.....	\$8.50
15 ".....	20.00	3 ".....	12.50
20 ".....	25.00	4 ".....	15.00

For sale in New York at minimum rates by Wholesale Dealers in House Furnishing Goods generally.

CHAS. W. PACKER, Manufacturer, Philadelphia.

Hardware.

ROY & COMPANY,

West Troy, N. Y.,

Manufacturers of

Wrought Iron Butts, Strap and T Hinges,
PLATE AND HOOK HINGES,

Cold Pressed Nuts and Washers, Felloe Clips, &c

JOHN L. FISHER, Agent, 116 Duane Street, New York.

SPEAR & JACKSON,

Sheffield, England,

MANUFACTURERS OF

Saws, Files, Edge Tools and Steel

JOHN L. FISHER, Agent,

116 Duane Street, NEW YORK.

STANLEY WORKS,

MANUFACTURERS OF

Wrought Butts, Strap and T Hinges.

Bronzed Butts and Bolts.

Wrought Barrel, Square and Shutter Bolts.

Wrought Chest Handles, Washers, Flush Bolts, &c

79 CHAMBERS ST., NEW YORK.

Factory at New Britain, CONNECTICUT.

F. WIEBUSCH,

IMPORTER OF

**German, Sheffield and Birmingham
HARDWARE AND CUTLERY, CHAINS AND ANVILS,**

No. 84 Chambers Street, N. Y. Office at Sheffield, No. 1 Arundel Lane.

Agent for WM. WILKINSON & SONS, Sheep Shears and Hedge Shears.

do THEILE & QUACK, German Hardware and Cutlery.

do GEO. FISHER & CO., Files.

do HENRY WALDRON, English Grain and Grass Scythes.

do J. D. THEILE, Chains.

Headquarters for PETER WRIGHT'S Anvils and Vises.

do JOHN WILSON'S Butcher Knives.

do W. & S. BUTCHER'S Files, Edge Tools and Razors.

Also, Manufacturers of "MONUMENTAL" and "TYLER" Pocket Cutlery.

HILGER & SONS,

87 Chambers and 69 Reade Streets, NEW YORK

MANUFACTURERS AND IMPORTERS OF

German Hardware, Cutlery, Scissors, Coffin Lace, Sheep Shears,

Ball Braces, Bright Halter and Coil Chains, &c.

Also, Birmingham and Sheffield Hardware and Chains, Butcher's Files, Edge Tools & Razors, Wostenholm's Razors & Farriers' Knives, John Wilson's Butcher Knives and Steels, Stub's Tapers, Chesterman's Metallic Tapes, Isaac Greave's Hedge Shears, James Bees & Parkin's Spoke Shaves, Turn Screws and Braces, Pad Locks, Goulcher's Gun Locks, Brades Trowels, &c.

HERMANN BOKER & CO.,

OFFICES AND WAREHOUSES:

NEW YORK, 101 and 103 Duane and 91 and 93 Thomas Streets.

REIMSCHNEIDER and SOLINGEN (Prussia.) H. BOKER & Co.

SHEFFIELD (England), No. 3 Arundel Lane, Represented by Mr. ARTHUR LEE.

LIEGE (Belgium), Represented by Mr. LOUIS MULLER.

Manufacturers and Importers of Cutlery, Guns, Hardware and Railroad Material.

Proprietors of TRENTON VISE AND TOOL WORKS, Trenton, N. J.—Vises, Picks,

Mattocks, Grab Hoes, Sledges, Hammers, Bridge Work, Turn Tables, etc.

Proprietors of the MANHATTAN CUTLERY CO., "O. K." Razors.

Sole Agents for LAMSON & GOODNOW MFG. CO., Shelburne Falls, Mass.—Table Cut-

lery and Butcher Knives.

W. & S. Butcher's Files, Edge Tools and Razors, the largest stock in the United States.

Geo. Wostenholm & Son's Knives, Scissors and Razors, the largest stock in the U. S.

John Wilson's Butcher and Shoe Knives.

Peter Wright's and Armitage Anvils.

We always have on hand a full assortment of

German and English Hardware, Cutlery, Guns, Gun Material,

Chains, Heavy Goods.

BEAM & MURRAY,

IMPORTERS OF

Anvils, Chains, Pocket Cutlery,
Guns, Files,

BIRMINGHAM, SHEFFIELD & GERMAN HARDWARE,

Wostenholm's IXL Pocket Knives & Razors, Butcher's Files, Tools, &c.

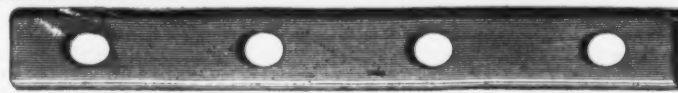
No. 54 Cliff Street, NEW YORK.

Hardware.

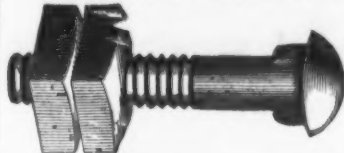
PRATT & CO.,
BUFFALO IRON and NAIL WORKS, Buffalo, N. Y.

Branch Office, 55 Chambers Street, New York.

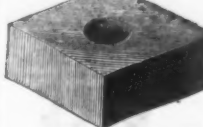
Manufacture Bar, Angle, and Plate Iron, Spikes and Nails, Railroad Fish Plates, Bolt and Spikes, Railroad and Contractors' Supplies in general, Bolt Blanks, Coach Screws, "Adams Nut Lock."



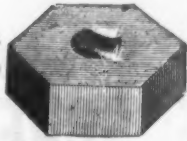
Plates Punched and Cut Hot. Bolts and Spikes, Superior Stock



COLD PUNCHED NUTS.



All sizes constantly on hand. We use the best Lake Superior Iron, and make a uniform handsome nut. Orders solicited. We make washers a specialty. Also



Wholesale Dealers in and Manufacturers of every description of

HEAVY AND SHELF

HARDWARE.

PRATT & CO., Buffalo, N. Y.

GEORGE B. WALBRIDGE,

Manufacturers' Agent,

55 Chambers St., New York, Represents:

National Horse Nail Company.

POLISHED AND POINTED NAILS.

Shoenberger's HAMMERED HORSE SHOES.

PRATT & CO., BUFFALO HORSE NAILS, NUTS, WASHERS, Crow Bars, &c.

SHELTON CO., BED SCREWS, CARRIAGE BOLTS, TACKS, &c.

WOOLWORTH HANDLE WORKS, Axe, Pick and Sledge HANDLES.

D. H. GOODELL, CHERRY STONERS, Apple and Peach Pavers.

Ten Eyck Mfg. Co., SLEDGES, GRUB HOES, HATCHETS, &c.

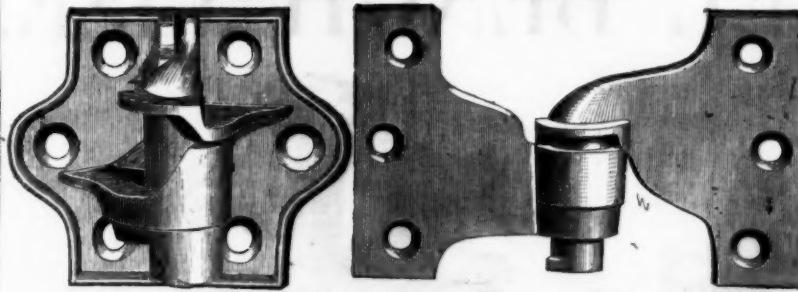
Woods Cutlery Co., Hot Water Proof TABLE CUTLERY.

ELEPHANT AXES, HATCHETS, EDGE TOOLS.

ALWAYS COOL STOVE LID LIFTERS, Ventilated Handles.

CHALLENGE AUGERS and BITS, Croton Falls Manuf'g Co.

BUFFALO FILE Company.

CLARK & CO.

Surface. Patented Nov. 3, 1868. Mortise.

THE STRONGEST BLIND HINGES IN MARKET.

Upper and Lower Hinges are alike, locking the top and bottom of the Blinds. On long Blinds three or more may be used without mismatching sets, and all will fasten. They cannot be broken or closed by the wind.

We would call the attention of the trade to our Improved Reversible Self-Closing Gate Hinges. Also, our Improved Axle Pulleys, Both Iron and Boxwood Wheel, Sash Locks, Sash Bolts, &c

CLARK & CO., Buffalo, N. Y.

Send for Illustrated Catalogue and Price List.

YALE LOCK MFG. CO.

Office and Works

at

STAMFORD,

Conn.

Salesroom

No. 298 Broadway,

New York.



FULL SIZE OF KEY.

FINE FLAT-KEYED LOCKS for all Purposes.

RIM and MORTISE STORE DOOR LOCKS,
Heavy Front Door and Vestibule Locks.

Rim and Mortise Night Latches,

CLOSET, CHEST, DRAWER, DESK and PADLOCKS,

Post Office Lock Boxes and Prison Locks,

Leeds' Gate Fixtures, Field's Shutter Bars, etc., etc.

The Yale Lock Manufacturing Co.,

STAMFORD, CONN.

The Best TUMBLER LOCK Ever Made.



New Pattern Key. No. 500 Yale Lock.

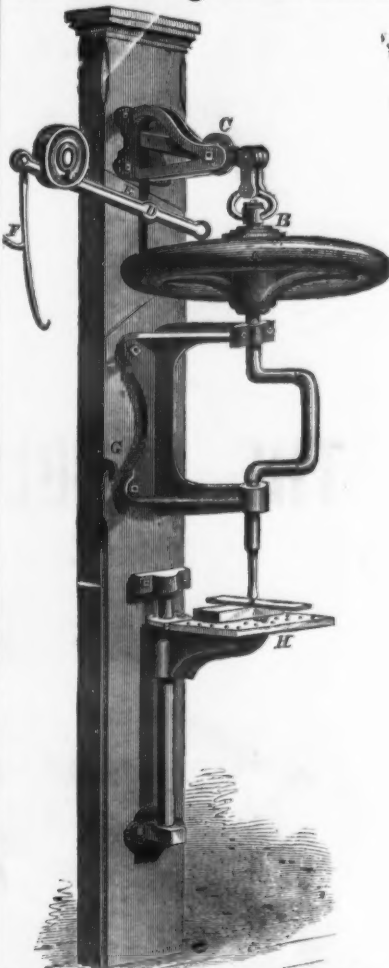
Samples sent on Application

Hardware.

BIDDLE MANU'FG CO.

PATENT

Self Feeding Hand Drill.



Fine Tools & Hardware Specialties

Warerooms,

78 Chambers Street, N. Y.

Send for catalogue. Sole Agents for the Pacific Coast,

CONROY, O'CONNOR & CO.,

San Francisco, Cal.

THE

Peck, Stow & Wilcox Co.,

MANUFACTURERS OF

TINNERS'

Tools and Machines,

AND

GENERAL HARDWARE

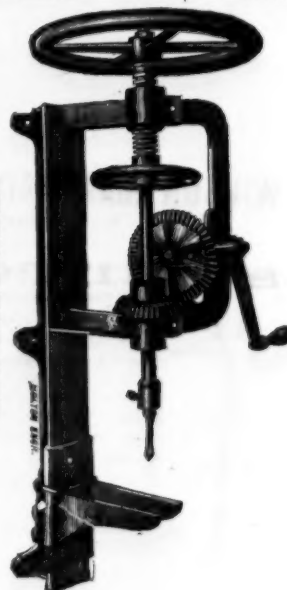
97 Chambers Street, New York.



FRANKLIN S. MILES, Manufacturer of

Brass, Iron, Steel and German Silver
SCREWS,
205 Quarry Street, Philadelphia.

Blacksmiths' Hand Drill.

Manufactured by MORRELL & TIEBOUT,
Cor. of Grand & First Sts., Williamsburg, N. Y.
Send for Circular and Price List.

HARDWARE.

[illegible]

Paper Stock, Old Metals, &c.

(Dealers' Selling Prices.)

Canvas linen	5 1/2 @ 6
" cotton, No. 1	7 @ 7 1/2
" " No. 2	4
White linen rags, No. 1	7 @ 7 1/2
" " No. 2	5 @ 5 1/2
Colored	3 @ 3 1/2
Mixed wools	4 @ 4 1/2
Soft wools	5 1/2 @ 6
Guany bagging	2 1/2 @ 2 3/4
Jute Butts	1 1/2 @ 2
Kentucky bagging	3 1/2 @ 3 3/4
Book stock	4 1/2 @ 4 3/4
Waste paper and scraps	3 1/2 @ 3 3/4
Rope cuttings	1 1/2 @ 3
Kentucky Bale rope	4 @ 4 1/2
Oakum Junk, No. 1	5 1/2 @ 5 3/4
" No. 2	4 1/2 @ 4 3/4
Grass rope	4 1/2 @ 4 3/4
Tarred Shaking	1 1/2 @ 2

Old Metal.

Copper	27 @ 28
Yellow metal	18 @ 22
Brass	18 @ 21
Old lead, solid	6 1/2 @ 6 3/4
Tea lead	6 1/2
Wrought iron	1 1/2 @ 2
Sheet iron	1 @ 6
Cast iron	1 @ 1 1/2
Machinery iron	1 1/2 @ 2
Zinc	5 1/2
Pewter, No. 1	26 @ 27
" No. 2	10 @ 12
Spelter	7

Paints, Oils, etc.

Paints.

Black, lamp—Coach Painters	7 @ 20c
" Ordinary	6c
" Ivory Drop, fair	15c
" " best	20c
Black Paint, in oil	kegs, 8c; asst'd cans, 11c
Blue, Prussian, fair to best	50 @ 75c
" " in oil	30 @ 65c
" Chinese, dry	88c
" Ultramarine	25 @ 30c
Brown, Spanish	1 1/2 @ 1c
" Van Dyke	9c
Caroline, 40	113 @ 10
Green, Chrome	15 @ 25c
" " in oil	15 @ 25c
" Paris	good, 80c; best, 40c
" " in oil	30c
Mineral Paints	1 1/2 @ 4c
Orange Mineral	145c
Red Lead, American	94c
" English	105c
" Venetian (N. C.) dry	3 1/2 @ 3c
" " in oil	asst'd cans, 11c; kegs, 85c
" Indian, dry	10c
Rose Pink	13c
Sienna, American, Raw	13c
" Burnt	4 1/2 @ 4c
" " in oil	16 @ 25c
" Raw	15 @ 25c
Umber, Burnt	4 @ 8c
" " in oil	16 @ 21c
" Raw	3 1/2 @ 75c
" " in oil	16 @ 21c
Vermillion, Chinese	81 @ 40
" English	1 1/2 @ 1 1/2
" Aricote	1 1/2
American, Common	23c
White Lead, American, pure dry	12 @ 1c
" " in oil	12 @ 1c
White, Paris, English, prime	in bbls. 2 1/2 @ 2 1/2
Yellow Ochre, French	12 @ 1c
" " in oil	asst'd cans, 11c; kegs, 85c
" Vermont	in cans 1 1/2 @ 1c
" Chrome	in oil 15 @ 25c
Zinc White, American No. 1 dry	9c
" " in oil	11 @ 1c
" French (Paris)	11 @ 1c
" " in oil	12 @ 1c

Oils.

Lined Raw	per gal. casks, \$1.00; bbls, \$1.01
" Boiled	" gal. casks, \$1.05
Whale, Crude	" gal. casks, \$1.05
" Bleached Winter	" gal. casks, \$1.05
Sperm, Crude	" gal. casks, \$1.05
" Winter unbleached	" gal. casks, \$1.05
Seal, Extra Refined	" gal. casks, \$1.05
Lard, Pure Winter	" gal. casks, \$1.05
" Spring	" gal. casks, \$1.05
Cotton Seed, Crude	" gal. casks, \$1.05
" Southern Yellow	" gal. casks, \$1.05
Neatfoot, Winter	" gal. casks, \$1.05
Natural Lubricating	" gal. casks, \$1.05

Sundries.

Asphaltum	8c
Benzine	per gal. 17c
Chalk	10c
Block	10c
Dryer, Patent, Am'n	asst'd cans, 11c; kegs, 85c
" English	11c
Flocks	20c
Frostings	20c
Glass, White	25c
" Sheet	25c
Glaziers' Points, Zinc	10c
Gum, Copal	25c
" Damar	25c
" Shellac, English	25c
" dark	40c
Litharge	10c
Fumec Stone, selected Lump	4 @ 6c
" powdered	4 @ 6c
Putty in bladders	3 @ 6c
" in bulk	3 @ 6c
Bottom Stone, soft, English	83 @ 25
Sand Paper, crystal	48 @ 25
" mint	48 @ 25
Spirits Turpentine	4c
Waiting, Spanish	15c

French Windows—1st, 2d, 3d, and 4th qualities. Per box of 50 feet.

SIZES.

	I.	II.	III.	IV.
6 x 8 to 10 x 15	10-15	10-15	10-15	10-15
11 x 14 to 12 x 18	11-15	10-25	9-15	8-15
10 x 16 to 14 x 26	12-50	11-50	10-25	9-10
15 x 22	15-25	12-50	10-25	9-10
15 x 26 to 20 x 30	15-25	14-50	12-50	10-25
22 x 30 to 24 x 30	19-25	16-25	13-50	10-25
26 x 30 to 24 x 36	20-25	17-50	14-50	10-25
28 x 30 to 26 x 44	22-25	20-25	15-50	10-25
28 x 44 to 30 x 50	24-50	21-50	16-25	10-25
30 x 32 to 30 x 54	27-25	24-50	18-25	10-25
30 x 56 to 34 x 56	28-50	26-25	22-50	10-25
34 x 38 to 34 x 60	31-50	29-50	25-50	10-25
36 x 60 to 40 x 60	37-50	32-50	29-50	10-25

DOUBLE.

	I.	II.	III.	IV.
6 x 8 to 10 x 15	16-50	14-50	13-50	12-50
11 x 14 to 12 x 18	17-25	15-50	14-25	13-25
10 x 16 to 14 x 26	18-25	17-25	15-50	13-50
15 x 22	20-50	19-50	16-25	14-25
15 x 26 to 20 x 30	24-50	21-50	18-50	15-50
22 x 30 to 24 x 30	30-50	27-25	21-25	18-25
26 x 26 to 24 x 36	31-50	29-50	21-50	18-25
28 x 30 to 26 x 44	34-50	30-50	23-25	18-25
28 x 44 to 30 x 50	36-50	32-25	25-25	18-25
30 x 32 to 30 x 54	41-50	37-50	28-25	18-25
30 x 56 to 34 x 56	45-50	39-50	33-50	18-25
34 x 38 to 34 x 60	48-50	45-50	37-50	18-25
36 x 60 to 40 x 60	55-50	49-50	45-50	18-25

Sizes above—\$12 per box extra for every five inches. Discount to the trade 60 per cent.

Railway, Blacksmiths' and Miners' Tools.

Railroad and Coal Picks, Crow Bars, Mauls, Tamping Bars and Picks, Rail Tongs, Sledge, Hand, Stone and Striking Hammers, Smiths' Tongs, Gas Pipe Tongs, Telegraph Pole Bars, Cold Chisels, Wedges, Froes, Cast Steel Drills.

Self-colored Picks.....\$8.00 per dozen. Ground and Polished..... 9-60

Send for Catalogue.
JAMES E. HALSEY,
Manufacturers' Agent,
76 Reade Street, New York.

HORACE DURRIE,

97 Chambers and 81 Reade Streets, N. Y.

Hardware Manufacturer,

AND AGENT FOR

RHODE ISLAND HORSE SHOE CO.
L. COES & CO.'S GENUINE SCREW
WRENCHES.
NEW LONDON HORSE NAIL CO.
WHEELER, MADDEN & CLETONSON.
WHEELER, CLETONSON & CO., FILES.
AMOSKEAG AXE CO.
TUTTLE MANUFACTURING CO.
EMPIRE MILLS TWINES.
FRENCH, SWIFT & CO.'S AUGERS & BITS.

AUBURN TOOL CO.'S PLANES.
WINSTED HOE CO.'S PLANTERS
HOES AND TOE CALKS.
WITHERBY TOOL CO.'S CHISELS,
DRAWING KNIVES AND BORING
MACHINES.
OHIO BUTT CO.
STEPHENS & CO.'S RULES.
FISHER & NORRIS, EAGLE ANVILS,
BOSTON BELTING CO., RUBBER
GOODS.

OHIO BUTT COMPANY,

JOLIET, ILL.

MANUFACTURERS OF

CAST BUTT HINGES,

Drilled and Wire Jointed, Fast and Loose, Loose Pin Reversible, Plain, Japanned, and Japanned with Silver Acorns. Loose Joint Japanned, and the same with Japanned or Silver Acorns.

We have appointed

HORACE DURRIE,
No. 97 Chambers St., New York,
Our only Agent in NEW YORK, BOSTON, PHILADELPHIA and BALTIMORE, for the sale of our goods,
and he is authorized to sell at our lowest factory rates.

Ohio Butt Co.

L. COES & CO.,
Manufacturers of
L. COES' PATENT
GENUINE IMPROVED
SCREW
WRENCHES,
Worcester, Mass.

We have manufactured this style of wrench for the past two years. Our Mr. L. Coes, formerly senior member of the firm of L. & A. G. Coes, established in 1839, is the Original Inventor of the Screw Wrench, and has, by making the bar wider, where the strain comes most severe, and screwing a nut up firmly against four square shoulders inside the ferrule, thereby effectually preventing the ferrule from being thrust back into the handle or getting loose, and making a larger screw than in the old wrench, fully succeeded in making a 12 inch wrench stronger than a 15 inch made in the usual manner. All sizes are made in this way, and are undoubtedly the strongest and best finished Screw Wrenches in the market.

There are imitations of our goods offered for sale, that, without question, infringe on our Patents.

We hold Patents bearing date Nov. 18th, 1863 (re-issued June 1st, 1869), June 26th 1866, March 23d, 1869 (re-issued April 15th, 1870), and May 14th, 1872, which fully cover all our improvements. One of the above cuts represents a sectional view, showing the nut under the ferrule, and the strengthened bar, that part being covered by the jaw, as seen in the cut of wrench complete. None genuine unless stamped

"L. COES & CO"
Warehouse, 97 Chambers and 81 Reade Streets, New York.
HORACE DURRIE, Agent.
Parties ordering from the New England States can order direct from the manufacturers
L. COES & CO.,
Worcester, Mass.

MIDDLETOWN TOOL CO.,
MIDDLETOWN, CONN.,
MANUFACTURERS OF

The Celebrated "Baldwin" Plane Iron,
HENSHAW'S PATENT HARNESS SNAPS
GERMAN HARNESS SNAPS,
PAT. GAFF TOP-SAIL SELF-MOUSING SHIP HOOKS,
Plow, Fillerster & Dado Stops of all kinds, Set Screws for Plows, Bench Plane Starts, &c. Patent Washer Cutters, Plane Iron Screws to order of any size.
Send for Illustrated Catalogue and Price List.

Improved Stationary Engines.
Always on hand assortment of sizes from 10 to 200 horse power. Second-hand engines taken in exchange when desired.

Climax Turbine Water Wheels.
Assortment of sizes always on hand.

Pulleys, Shafting, Gearing and General Machinery.
Send for Circular.
WHITEHILL, SMITH & HAMPSON,
NEWBURGH, N. Y.

NEWCOMB BRO'S SONS,
Manufacturers of
Smiths', Moulders' and Hand
Also the Sole Manufacturers of
Bowden's Patent
TRIPLE-ACTION
Bellows.

These Bellows are superior to all others now in use.
For further particulars send for descriptive circular and price list.
586 Water St., near Montgomery, N. Y.
Canal Street, East Broadway and South Street Cars cross Montgomery St.

Peck's Patent
Drop Press
MILO PECK & CO.
SOLE MANUFACTURERS.
NEW HAVEN, CONN.

PRICE LIST.
FOR FORGING.

No.	Weight of Hammer.	Distance between Uprights.	Lift of Hammer.	Price Complete.
2	100 lbs.	8 in.	24 in.	\$ 380 00
3	150 "	10 "	30 "	467 00
4	250 "	12 "	30 "	750 00
5	400 "	16 "	30 "	900 00
6	650 "	16 "	30 "	1300 00
7	1000 "	16 "	30 "	1800 00
8	1500 "	16 "	30 "	2500 00

FOR STAMPING SHEET METALS.

No.	Size of Die Bed.	Weight of Hammer.	Price of Drop without Lifter.	Price of Lifter.
1	6 in.	50 lbs.	\$ 187 50	\$ 82 50
2	8 "	100 "	215 50	187 50
3	10 "	150 "	300 00	230 00
4	12 "	250 "	400 00	340 00
5	16 "	400 "	550 00	490 00
6	20 "	650 "	750 00	620 00
7	24 "	1000 "	1200 00	620 00
8	36 "	1500 "	1850 00	850 00

All sizes larger than No. 3 have Wrought Iron Cranks to the Lifter.
Our Patent Drop Lifter can be applied to any Drop in use.

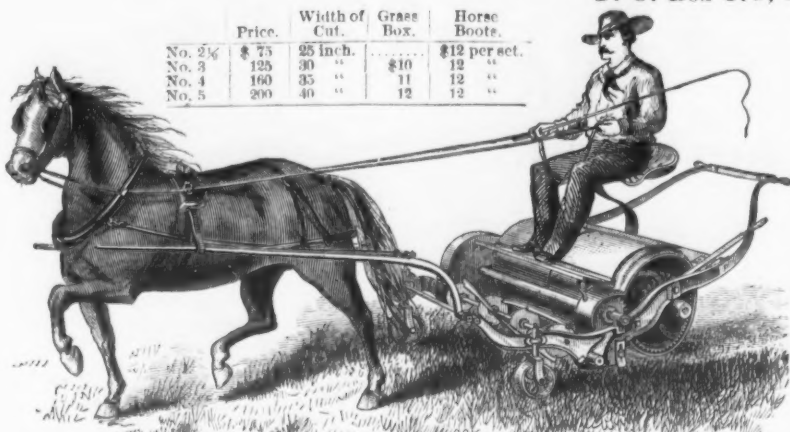
CHASE'S BUTTON-HOLE CUTTER,
The BEST and CHEAPEST made.

Manufactured and for sale by
GOODNOW & WIGHTMAN,
Boston, Mass.
\$10.00 per doz. Liberal discount to the Trade.

The National Screw Co.,
MANUFACTURERS OF
Patent Dovetailed Slot Gimlet-Pointed
IRON AND BRASS SCREWS.
COMPLETE ASSORTMENT OF SIZES.
RUSSELL & ERWIN MFG. CO., Sole Agents
45 and 47 Chambers Street, New York.
P. O. Box 3298. Orders filled promptly.

The Improved Excelsior Lawn Mowers, FOR HAND OR HORSE POWER, MANUFACTURED BY CHADBORN & COLDWELL MANUFACTURING CO.

P. O. Box 479, NEWBURGH, N. Y.



No.	Price.	Width of Cut.	Grass Box.	Horse Boots.
No. 2 1/2	\$ 75	25 inch.	12	12
No. 3	125	30 "	12	12
No. 4	160	35 "	11	12
No. 5	200	40 "	12	12

No. 0 Hand Mower—Cuts 11 inches. Price, \$16.
No. 1 " " 14 " " \$25.
No. 2 " " 15 " " \$30.

The No. 1 for general use, and warranted. The No. 2 for large lawns—when smooth.

The Excelsior is simple and durable. The gearing securely incased and will not clog. Has a full roller, without which no machine is perfect. A ball ratchet—"noiseless"—needs no oiling. Adjustable wrought iron handle. Hangers secured by bolts. The front rollers to these are adjustable, to vary the height of cut. Open balance wiper—with steel knives—the only practicable means of securing strength and ease of draught. Patent iron handle, with attachment on each side of the machine—avoids the serious annoyance of a single wooden handle. The Excelsior Lawn Mower having been before the public for four years, and subjected to the most severe tests, the manufacturers feel warranted in asserting that for *superiority in simplicity of construction and durability* it has no equal. It is important in either Horse or Hand Lawn Mowers, that their design should combine the greatest strength with least amount of metal; we therefore use only the very best material, together with good workmanship, enabling us to produce Lawn Mowers light in weight, of easy draught, and at a price within the reach of all.

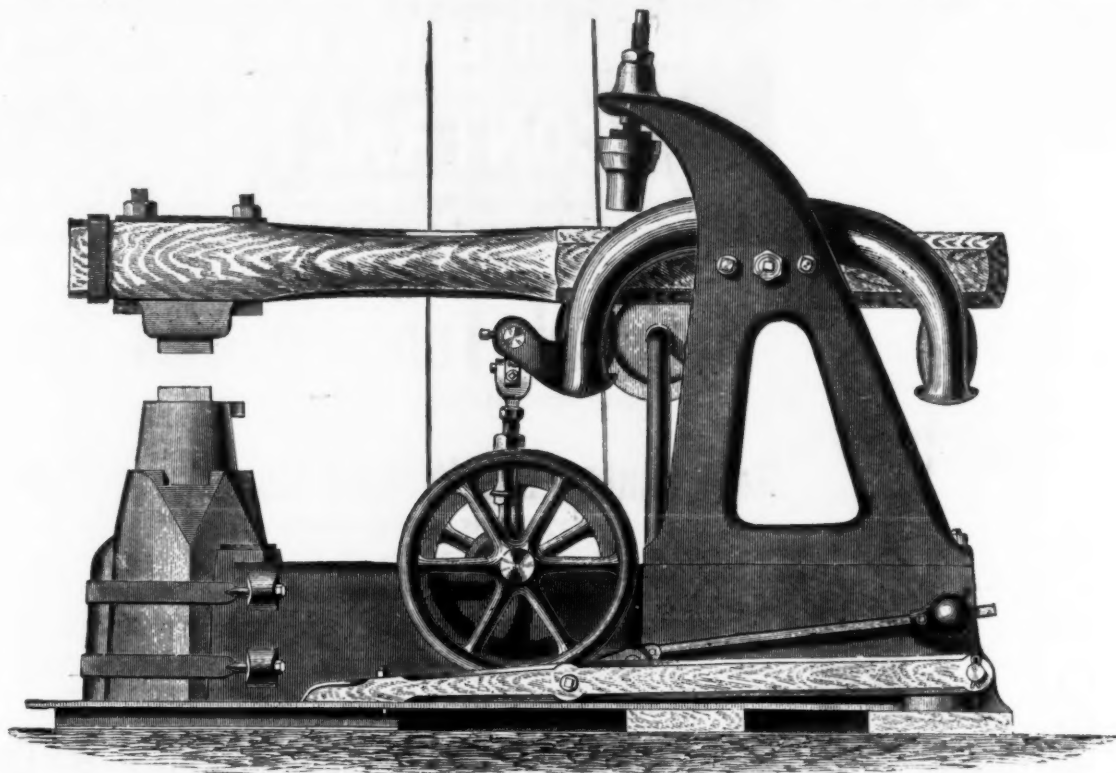
The Excelsior has received the most favorable commendation from all, and the advantages claimed for it over other machines are fully appreciated wherever it is known. To this we add numerous testimonials, but the fact that our sales have greatly increased year by year, is the most convincing proof of its adaptation to the wants of the public.

GRAND SILVER MEDALS AWARDED THE EXCELSIORS AT THE

New England Fair, held at Lowell, Mass., Sept., 1871 and 1872; New Jersey State Fair, held at Waverly, N. J., Sept., 1871 and 1872; the first premium at the New York State Fair, 1871; Western New York Fair, 1871; Ohio State Fair, 1871 and 1872; Northern Ohio Fair, 1871 and 1872; Michigan State Fair, 1871 and 1872; Indiana State Fair, 1871; Wisconsin State Fair, 1871 and 1872; Tennessee State Fair, 1871; Virginia State Fair, 1871; South Carolina State Fair, 1871.

For description of Mowers, and particulars, send for catalogue. Agents wanted. A liberal discount to the trade.

BRADLEY'S CUSHIONED HAMMER.



This Hammer is a great improvement over the old style of helve hammers. It is all made of Iron and Steel except the helve and cushions. It is portable, takes up but little room, and makes no noise except the stroke of the hammer. It takes less power to drive it, and it turns out more and better work. The helve is nicely balanced upon two adjustable hardened steel centers, and there is no bind or friction connected with its action. It will endure more hardships at less expense for repairs, and, consequently, outlasts any other. Its capacity is greatly increased, but not at the expense of its size, convenience or durability. It strikes a more accurate, forcible and elastic blow than any other hammer. It is being used and is peculiarly adapted for the exceedingly difficult work of swedging cotton spindles; no other hammer has been able to do this work as perfectly and economically. It is the favorite of every hammerman; it promptly obeys his every touch, and he soon regards it as a thing of life. We warrant them as recommended, and refer you to the following parties now using them:

W. H. Haskell & Co., Pawtucket, R. I.
Cole Brothers, Pawtucket, R. I.
American File Co., Pawtucket, R. I.
Fales, Jenks & Son, Pawtucket, R. I.
Providence Tool Co., Providence, R. I.
Nicholson File Co., Providence, R. I.
Woonsocket Iron Foundry, Woonsocket, R. I.

For particulars address

John Berkenhead, Mansfield, Mass.
Steele & Condit, Jersey City, N. J.
Silby Mfg. Co., Seneca Falls, N. Y.
Cowing & Co., Seneca Falls, N. Y.
Rumsey & Co., Seneca Falls, N. Y.
Clapp, Fitch & Co., Auburn, N. Y.
Sweet, Barnes & Co., Syracuse, N. Y.

Warder, Mitchell & Co., Springfield, O.
Robert Doyle, Watseka, Ill.
Furst & Bradley Mfg. Co., Chicago, Ill.
Chicago Plow Co., Chicago, Ill.
Mark H. Richards, Pottstown, Pa.
Peters Bros. Mfg. Co., Marshall, Mich.
Studebaker Bros. Mfg. Co., South Bend, Ind.

BRADLEY MFG. CO., Syracuse, N. Y.

Biddle Manufacturing Co., FINE TOOLS

Hardware Specialties.

We call the attention of Carriage Makers, Machinists, Iron Railing Manufacturers, Blacksmiths, and all others interested in Drilling, Punching or Cutting Iron, to our

Improved Drill Press, Shear and Punch,

feeling assured that upon examination their merits must be apparent to every one, from the fact that they possess the essential characteristics of strength, power and cheapness, in a high degree.

Illustrated Catalogues and Price Lists furnished on application.

We are also prepared to furnish light work of any description and in any quantity to order.

All kinds of Die Forgings promptly attended to.

OFFICE & WAREHOUSES, 78 Chambers Street, New York.

Sole Agents for the Pacific Coast, CONROY, O'CONNOR & CO., San Francisco, Cal.

WEST POINT FOUNDRY,

Established 1817. COLD SPRING, N. Y.

Paulding, Kemble & Company,

Office 30 Broadway, New York; Works at Cold Spring, Putnam Co., N. Y.

Steam Engines, Boilers & Heavy Machinery of all kinds, and Heavy Forgings.

FORD'S PATENT STOVE, for heating Air for Blast Furnaces.

Hornig's Patent Shearing and Punching Machines,

NAPIER'S PAT. DIFFERENTIAL CLUTCH, for starting and reversing Heavy Machinery.

Hepworth's Patent Centrifugal Machines.

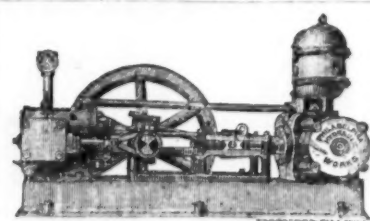
Castings from Gun Metal, guaranteed 30,000 pounds per square inch.

Edge Tools, BROAD, SHINGLING AND CLAW HATCHETS.

The best low priced Goods in the Market.

Shingling Hatchets from \$4.00 to \$8.00 per dozen.
Claw " " \$5.00 to \$6.50 " "
Ohio and Kentucky Pattern Chopping Axes, all weights. The Trade only supplied.
Send for Price List.

JAMES E. HALSEY, Mfrs.' Agent,
76 Reade Street, New York.



PHILADELPHIA HYDRAULIC WORKS

Evelina Street, east of 3d Street, below Walnut,

Philadelphia, Manufacturers of

Steam Pumping Machinery

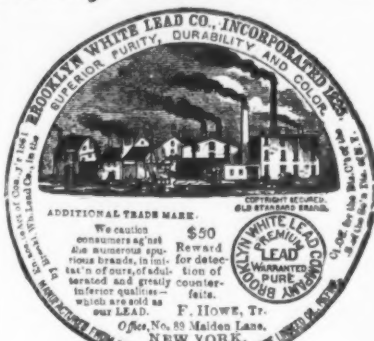
of every description. Send for Illustrated Price List.

White Lead, &c.



Union White Lead Mfg. Company,
26 Burling Slip, New York.
B. W. How, Secretary. James How, President
MANUFACTURERS OF
White Lead, Red Lead, Litharge
Orange Mineral.

Brooklyn White Lead Co.



White Lead, Red Lead and
Litharge.
89 Maiden Lane, NEW YORK.
FISHER HOWE, Trans.

JOHN JEWETT & SONS Manufacturers of the well known Brand of WHITE LEAD.



TRADE MARK.
Also Manufacturers of
LINSEED OIL
AND FLOUR OIL CLOTHS,
182 Front Street NEW YORK.



FOR SAMPLE CARDS.

Our Paint is made of the very best material known to painters, viz: White Lead, Zinc and Linseed Oil, chemically combined, and is superior to any paint known to the trade. The advantages being that

It is ready for use.
It is applied with less labor.
It shows a beautiful enamel surface.
It does not chalk or peel off.
It does not run from nail holes or corners.
It is fire proof and water proof.
It covers old work as well as new.
It is the best paint for iron buildings.
It is equal to any for covering brick.
It is a perfect wood preservative.
It is, before dry, does not wash off.
It is durable, retaining its enamel and freshness.

Sold by the Gallon only, in Cans or Barrels.
Office, 43 Chambers St., N. Y.

Cornell Lead Co.,

Delaware and Virginia Streets, BUFFALO, N. Y.



WHITE LEAD Dry and in Oil,
Lead Pipe, Sheet and Bar Lead.

G. CORNELL, Presl. A. P. THOMPSON, Vice-Presl.
S. DOUGLAS CORNELL, Secy.



The Atlantic White Lead and Lin
seed Oil Company,
MANUFACTURERS OF
White Lead (Atlantic), Red Lead
Litharge & Linseed Oil.

ROBERT COLGATE & CO.,
257 Pearl Street, New York.

John T. Lewis & Bros., No. 231 South Front St., PHILADELPHIA.



TRADE MARK.
MANUFACTURERS OF
PURE WHITE LEAD, RED LEAD,
Litharge, Orange Mineral,
Linseed Oil
AND PAINTERS' COLOR.



No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11.
FOR PRICES ADDRESS
ENTERPRISE MFG. CO., of Pa., or **GRAHAM & HAINES, Agents,**
HARDWARE MANUFACTURERS, 88 Chambers St., New York.
W. Cor. of American and Dauphin Sts., PHILADELPHIA.

SANDUSKY TOOL CO.,

MANUFACTURERS OF

Planes, Plane Irons, Carpenters', Cabinet Makers' and
Coopers' Tools,
Bench, Hand and Tail Screws,
and Chisel,
File and Auger Handles.

SANDUSKY TOOL CO., Sandusky, Ohio, or GRAHAM & HAINES, 88 Chambers Street N. Y.

Headquarters for

Henry Disston & Sons' Saws,
Hand, Mill, Circular and Cross Cut.

ALSO,

Plumbs and Levels, Try Squares, Gauges, Trowels
and Barker's Reversible Butt.

A full assortment constantly on hand. Address orders to

GRAHAM & HAINES, 88 Chambers Street, N. Y.

Samuel Loring's Tacks and Rivets.

Warehouse, 88 Chambers Street, New York.

A full assortment of

TACKS (all kinds), BRADS, TRUNK, CLOUT, HUNGARIAN and
FINISHING NAILS.

Also, BLACK and TINNED RIVETS always on hand for
immediate delivery, if required.

GRAHAM & HAINES, 88 Chambers Street, New York, Agents.

Philadelphia Tool Co.,



MANUFACTURERS OF

Davis' Patent Duplex Wrench,

A tool well made of Best Materials, combining all the good qualities of a regular Nut Wrench of equal size with that of at least six pairs of Pipe Tongs. For circulars and price lists, address,
PHILADELPHIA TOOL CO., Office & Works, S. W. cor. 13th & Buttonwood Streets, Phila.,
Or GRAHAM & HAINES, Agents, 88 Chambers Street N. Y.

The Hubbard & Curtiss Mfg. Co.,

No. 82 Chambers St., N. Y., Manufacturers of

Our New Patent Improved Self-Tightening Drill Chuck, Victor No. 3.

The cut at the right shows the extra set of jaws which we furnish when ordered, at \$3.00. They can be used for chucking small articles for turning, boring, &c., from 0 to 1 1/2 inch. The jaws can be changed in three minutes.

The best Chuck in the Market!

All its parts are of Cast Steel. Warranted to hold 1/4 to 0 drills with the clasp of the band.

Price Extra Jaws \$8.00.

No. 4 VICTOR CHUCK, same principle as No. 3, will hold drills from 1/4 shank down to 1/2 inch.

Price Extra Jaws \$10.00.

Also, manufacturers of our

UNIVERSAL DRILL CHUCKS, No. 1 and 2,

AND OTHER
Machinists' Tools.

HOWE'S Patent Family Glue Pot.



The Pot and Cup are made of Cast Iron, like the ordinary Glue Pot, with a cover and serviceable brush. It is altogether the best of the cheap Glue Pots in the market, being in every thing except size exactly the same as those used by mechanics. From the large sales in the

past, we are convinced that it supplies a necessity long felt where Glue is required—in the family, store, bank and office. The Glue is prepared in a manner to prevent all decay or mould. It is always ready for use, and will save many dollars. They are packed half a dozen in a box, and twelve boxes in a case. Price, per doz. \$5, with a liberal discount to the trade.

Orders should be addressed to

Graham & Haines,
88 Chambers St., N. Y.

Or to the manufacturers,

The J. & E. Stevens Co.,
Cromwell, Conn.

Chain and Pulley for Heavy Sash
F. & L. MANY & MARSHALL,
48 Warren Street, NEW YORK.
Manufacturers of every description of
BUILDERS' HARDWARE,
Pure Branded Metal and Hand-Polished Knobs, Hinges, &c.,
Agents for Graham's Black Lead Compound.
Agency and Depot of the TRENTON LOCK COMPANY.

BIRMINGHAM, ENGLAND SAMUEL A. GODDARD & CO.,

Commission Merchants and General Agents,
execute orders for British manufactures on the lowest terms, and collect and forward goods for a very moderate payment. Agents for the sale of North Staffordshire Iron of a standard quality.

THE CHARLES GREGG MANUFACTURING CO.

BRASS WORK of all kinds,
FITTINGS FOR

Steam, Gas and Water.

PLAIN AND GALVANIZED

WROUGHT IRON PIPE,
Nos. 62 & 64 Gold Street,
NEW YORK.

Business Established, 1836. Incorporated, 1873.
Send for Price List.

Pipe, Fittings, &c

McNab & Harlin Mfg. Co.,

MANUFACTURERS OF

BRASS COCKS

For STEAM, WATER and GAS.

Wrought Iron Pipe & Fittings, Plain and Galvanized
PLUMBERS' MATERIALS.

Illustrated Catalogue sent by express to the Trade on application.

Factory, Paterson, N. J.

56 John Street, N. Y.

PANCOAST & MAULE

227 Pear St.

PHILADELPHIA.

WROUGHT IRON PIPE

FITTINGS, BRASS & IRON VALVES & COCKS
TOOLS & STEAM FITTERS SUPPLIES &c.
PIPE CUT & FITTED TO PLANS FOR MILLS &c.

SUCCEED MORRIS TASKER & Co. AS

CONTRACTORS

FOR HIGH & LOW PRESSURE STEAM HEATING
APPARATUS FOR ALL CLASSES OF BUILDINGS.

Send for Illustrated Catalogue.

National Tube Works Co.,

BOSTON, MASS. and McKEESPORT, PA.,

MANUFACTURERS OF

Best Quality Lap Welded Iron Boiler Tubes,
STEAM AND GAS PIPE,

Artesian Oil and Salt Well Tubing and Casing,
With Patent Protecting Coupling;

Mack's Patent Injector for Feeding Boilers.

JAMES C. CONVERSE, President,
McKeesport.

WM. S. EATON, Treasurer,
Boston.

New York Office and Warehouse, 78 William, cor. Liberty Street.

EATON & COLE.

Manufacturers of

Wrought Iron Pipe
Fittings,
BRASS
VALVES.

COCKS, TOOLS, &c.,

58 John Street, NEW YORK.

Sole Agency for the Pacific Coast for

Register's Patent Gauge Cocks,
CONROY, O'CONNOR & CO.,
San Francisco, Cal.

Nelson, Finkel & Co.,

439 East 10th St., New York,

Manufacturers of

Jenkins' Patent
Compression
Valves

AND
Gauge Cocks

Also,

Nelson's Patent
LUBRICATOR.

Warranted the most
reliable and durable
in the country.

CAST IRON PIPES

FOR WATER AND GAS.

Branches Retorts, &c.

Warren Foundry & Machine Co.,
PHILLIPSBURG, NEW JERSEY.

GRAFF TUBE WORKS.

WILLIAM GRAFF & CO.,

Manufacturers of Plain and Galvanized

Wrought Iron Pipe

For

Gas, Steam, Water, Oil, &c.,
No. 140 First Ave., PITTSBURGH, PA.

Pipe of any Size, Length or Thickness furnished to order.

Industrial Tube Works.

ISAAC J. GRIFFITHS & BROS.

Manufacturers of

Wrought Iron & Galvanized Tubes
For Gas, Steam and Water.

Brass and Iron Valves, Cocks,
Cast and Malleable Iron Fittings.

Tubes cut and fitted to plans and specifications.

1529, 1531, 1533 & 1535 South 7th St.,
PHILADELPHIA.

WM. S. CARR & CO.

Sole Manufacturers of

Carr's Patent Plumbers' Goods
Pumps, Water Closets, Fountains
Vases, &c.

OFFICE AND WAREHOUSES,

100, 108 & 110 Centre Street,
Factory, Mott Haven, New York.

PHILADELPHIA.

(Corrected weekly by Lloyd, Supple & Walton).
Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Arvills. —Solid Cast Steel.....	12 1/2
Peter Wright's.....	12 1/2
Wilkinson's.....	12 1/2
Eagle.....	12 1/2
Apple Parers. —Reading and Turn Table.....	8 00
Union.....	8 00
Axes. —Mann's Light.....	14 00 @ 14 50
Hunt's Light.....	12 50 @ 13 00
Red Indian, all sizes.....	12 50 @ 13 50
Red Chieftain, all sizes.....	12 50 @ 13 50
Crown Prince.....	13 50 @ 14 00
Augers and Auger Bits. —Pierce's Pat.....	20 @ 25
Twist Bit.....	20 @ 25
Bates & Ives' Bits.....	20 @ 25
Douglas' Bits.....	20 @ 25
Cook's Bits.....	20 @ 25
Bonney's Pat. Follow Augers.....	25 @ 30
Russell Jennings' Bits.....	20 @ 25
Bates & Ives Nut Augers.....	20 @ 25
Douglas Nut Augers.....	20 @ 25
Watrous' Ship Augers.....	20 @ 25
Blind-nails. —Lauders, Fry & Clark's.....	10 @ 15
Chattillon's.....	10 @ 15
Morton's.....	10 @ 15
Common Spring, with Hook.....	10 @ 15
Bells. —Bevin Bros. Mfg. Co. Hand Bells.....	10 @ 15
Extra Light Hand Bells.....	10 @ 15
Other makers light.....	10 @ 15
Connell's Door Bell.....	10 @ 15
Western and Kenton.....	10 @ 15
Boring Machines. —Bates' Mfg. Co., com.....	10 @ 15
Plot with augers.....	10 @ 15
Douglas' Mfg. Co., complete with augers.....	10 @ 15
Common Augers.....	10 @ 15
Anguar, Extra Auger.....	5 50 @ 4 00
Bolts. —Eastern Carriage Bolts.....	10 @ 15
Western.....	10 @ 15
Philadelphia.....	10 @ 15
Wrought Shutter Bolts.....	10 @ 15
Cast.....	10 @ 15
Bones. —Barber's.....	10 @ 15
Spofford.....	10 @ 15
Butts. —Cast Fast Joint, Narrow.....	10 @ 15
Cast Loose Joint.....	10 @ 15
Acorn Drilled.....	10 @ 15
Wrought Loose Joint.....	10 @ 15
Table Hinges and Back Flaps.....	10 @ 15
Narrow.....	10 @ 15
Loose Joint.....	10 @ 15
Parker's Blind Butts.....	10 @ 15
Shepard's.....	10 @ 15
Clark's.....	10 @ 15
Lull & Porter's.....	10 @ 15
Palmer's.....	10 @ 15
Garretson's.....	10 @ 15
Extra discount on Blind Butts by the case, 5 per cent.	
Chains. —German Halter.....	10 @ 15
Galvanized Pump.....	10 @ 15
English Chain, less than cast.....	10 @ 15
Common Chain.....	10 @ 15
Best Proof Chain.....	10 @ 15
By the case, 500 lbs. discount 5 per cent. per 100 lbs. Common Chain, 500 lbs. less than proof.	
Chisels. —Socket Framing.....	10 @ 15
Socket Framing.....	10 @ 15
Tang.....	10 @ 15
Beatty's Framing and Firmer.....	10 @ 15
Casters. —Porcelain Wheel.....	10 @ 15
Iron.....	10 @ 15
Brass.....	10 @ 15
Clothes Wringers. —Universal.....	10 @ 15
Novelty.....	10 @ 15
Providence.....	10 @ 15
In lots of 2 dozen, discount 2 per cent. per dozen.	
Coffin Wringers (Iron Frame).	10 @ 15
Coffee Mills. —Common Box and Side.....	10 @ 15
Patent Box and Side.....	10 @ 15
Cutters. —American Pocket best.....	10 @ 15
Lauders, Fry & Clark, J. Russell & Co. and Lanson & Goodnow Mfg. Co. Manufacturers' net prices.	
Drilling Knives. —Hart Mfg. Co.'s.....	10 @ 15
Concave Adjustable Handle.....	10 @ 15
Beatty's.....	10 @ 15
Files. —Nicholson Mill Files.....	10 @ 15
Nicholson Bastard.....	10 @ 15
Butcher's Mill.....	10 @ 15
Butcher's.....	10 @ 15
Morse & Gamble, Mill, Taper and.....	10 @ 15
Bastard.....	10 @ 15
Fluting Machines.	10 @ 15
Royal, No. 1, 1 1/2 inch Rollers.....	10 @ 15
Hammer and Hatchets.....	10 @ 15
Yerkes & Plumb's.....	10 @ 15
Hammond and Son's.....	10 @ 15
Hinges. —Strap and T.....	10 @ 15
Bonney's No. 1 Gate.....	10 @ 15
No. 2 and 3.....	10 @ 15
Horse Nails.	10 @ 15
Available.....	10 @ 15
Globe.....	10 @ 15
Brundage.....	10 @ 15
Putnam.....	10 @ 15
On Available, Globe and Brundage 1000 lbs. lots.....	10 @ 15
Knobs. —Door (regular manufacture).....	10 @ 15
Porcelain and Mineral.....	10 @ 15
Locks and Latches. —Rim and Mortise.....	10 @ 15
Till and Cupboard.....	10 @ 15
American Padlocks.....	10 @ 15
Thumb and Keyhole Latches.....	10 @ 15
Mattresses. —Long and Short Cutter.....	10 @ 15
Western Pattern.....	10 @ 15
Pennsylvania Pattern.....	10 @ 15
Melanes Gates.	10 @ 15
Enterprise Mfg. Co.'s Measuring Faucets.....	10 @ 15
Stebbins' Gates.....	10 @ 15
Lincoln's.....	10 @ 15
Lauders, Fry & Clark's Petroleum.....	10 @ 15
Taylor's Petroleum Faucets.....	10 @ 15
Rakes. —Cast Steel Garden.....	10 @ 15
Malleable Garden.....	10 @ 15
Wood Head Iron Teeth.....	10 @ 15
Rules. —Stanley Rule and Level Co.....	10 @ 15
Stanley Rule and Level Co.....	10 @ 15
Squares.....	10 @ 15
Saws.....	10 @ 15
Diamond's Hand and Cross Cut.....	10 @ 15
McNeely's Hand and Cross Cut.....	10 @ 15
Boynton's Lightning, new list.....	10 @ 15
Shovels and Spades.	10 @ 15
Rowland's Plain Back, list Feb. 1873.....	10 @ 15
Oliver Ames & Son's.....	10 @ 15
Brady Shovel Co. Mach.....	10 @ 15
Sad Irons.....	10 @ 15
Couanock (polished face).....	10 @ 15
Shovel Polish.	10 @ 15
Onyx.....	10 @ 15
Sevices.....	10 @ 15
Common Sevices.....	10 @ 15
Screws. —Iron.....	10 @ 15
Brass.....	10 @ 15
Spoons. —Plated Spoons, Rogers' Bros.....	10 @ 15
Britannia, Parker's and Boardman's.....	10 @ 15
German Silver.....	10 @ 15
Try Squares. —Dixon's.....	10 @ 15
Stanley Rule and Level Co.....	10 @ 15
Willis Thall, No. 2.....	10 @ 15
Willis Thall, No. 1.....	10 @ 15
Tacks, &c. —Half Weight.....	10 @ 15
Clout and Finishing Nails.....	10 @ 15
Traps. —Genuine Onions.....	10 @ 15
Imitation.....	10 @ 15
Wrenches. —Coe's Genuine.....	10 @ 15
Coe's Imitation Wrought Bar.....	10 @ 15
" Malleable Bar.....	10 @ 15
Taft Wrought.....	10 @ 15
Taft Malleable Bar.....	10 @ 15
Wire.....	10 @ 15
No. 10 to 12.....	10 @ 15
No. 12 to 14.....	10 @ 15
Coppered to 12.....	10 @ 15
Tinned Broom Wire.....	10 @ 15

BUFFALO.

Reported by Messrs. Sidney Shepard & Co.

Axe, Chopping. —Francis Axe Co.....	10 @ 15
Augers—C. S. Cut.....	10 @ 15
Bar Bit.....	10 @ 15
Bells, Auger—Pierce's.....	10 @ 15
Jennings'.....	10 @ 15
Bells, Cow—Yaw's Genuine.....	10 @ 15
Bellows—Smith's.....	10 @ 15
Bells—Carriage and Tire, Diamond Neck.....	10 @ 15
Braces, Bit—Barber's.....	10 @ 15
Spofford's Patent.....	10 @ 15
Brads, Cut.....	10 @ 15
Boards—Stove, Brooks' Patent, new list.....	10 @ 15
Butts—Brass.....	10 @ 15
Cast Loose Joint.....	10 @ 15
" Pin.....	10 @ 15
" Japanese.....	10 @ 15
Wrought Narrow.....	10 @ 15
Table and Back Flaps.....	10 @ 15

Wrought Butts, Loose Pin.....	10 @ 15
Beating—Huber.....	10 @ 15
Leather, new list.....	10 @ 15
Reaters, Eggs, Feeless.....	10 @ 15
Brick—Belt (Huber's 2 doz) Best English.....	10 @ 15
" Rutherford.....	10 @ 15
Burg Bore.....	10 @ 15
Blue.....	10 @ 15
Crayon School.....	10 @ 15
Chisels—Firmen Socket.....	10 @ 15
Chisel—Firmen Socket.....	10 @ 15
Corner Socket Chisels.....	10 @ 15
Elk's Carpenters.....	10 @ 15
Castings—Malleable.....	10 @ 15
Cherry Seeders.....	10 @ 15
Elbows—Corrugated.....	10 @ 15
Charcoal.....	10 @ 15
Russell.....	10 @ 15
Files—Wheeler, Madison & Clemmons.....	10 @ 15
Freezers, Ice Cream—Champion.....	10 @ 15
Gates—Molasses.....	10 @ 15
Patent Self-Measuring.....	10 @ 15
Hinges—Window Blind.....	10 @ 15
Shepherd's Standard, and Clark's.....	10 @ 15
Garretson's.....	10 @ 15
Wrought Strap and T.....	10 @ 15
Hods, Con—Plain, Black and Galvanized.....	10 @ 15
Funnel, Black and Galvanized.....	10 @ 15
Fancy and Helmet.....	10 @ 15
Hammers—Maydole's.....	10 @ 15
Yerkes & Plumb's.....	10 @ 15
Hoops and Staples—Wrought.....	10 @ 15
Hooks—Belt.....	10 @ 15
Files and Staples—Wrought.....	10 @ 15
Planes, Bench.....	10 @ 15
Sad Irons.....	10 @ 15
Kettles—Brass.....	10 @ 15
Knives, Drawing—Oval No. 1.....	10 @ 15
Razor Blade.....	10 @ 15
Lanterns—Feeless.....	10 @ 15
" Radiant.....	10 @ 15
Mica.....	10 @ 15
Machines—Apple Parer.....	10 @ 15
Tinners.....	10 @ 15
Mills, Coffee—Box and Slide.....	10 @ 15
Box Union and Eagle.....	10 @ 15
" Champion.....	10 @ 15
Nails—Cut, Chesapeake.....	10 @ 15
Clout and Finishing.....	10 @ 15
Horse, Amiable.....	10 @ 15
" Finished and Pointed.....	10 @ 15
Clinton.....	10 @ 15
Packing—Rubber.....	10 @ 15
Pencil, Slate—Soapstone.....	10 @ 15
Case lots.....	10 @ 15
Paint—White Lead, U. S. Gov't.....	10 @ 15
Rivets—Iron, Black and Tinned.....	10 @ 15
Copper.....	10 @ 15
Rope—Manila, 1/2 inch and larger.....	10 @ 15
Rules—Boxwood and Ivory, Stephens.....	10 @ 15
Staples—Blind, Boardman's Pat., 1/4 & 3/8.....	10 @ 15
Straps, Skate—Russell and Black.....	10 @ 15
Sponges, Iron Tinned.....	10 @ 15
Plated Rogers' A No. 1.....	10 @ 15
Britannia.....	10 @ 15
Squares—Steel and Iron.....	10 @ 15
Shoes, Horse—H. Burden & Sons.....	10 @ 15
Shovels and Spades—Shepard, Forsyth & Denison.....	10 @ 15
Saws—Henry Dutton & Son.....	10 @ 15
Scales—Buffalo Scale Works.....	10 @ 15
Fairbanks.....	10 @ 15
Tools—Timmen's.....	10 @ 15
Tacks, Steel—Newhouse.....	10 @ 15
Tack—Half Weight Am.....	10 @ 15
Vises—Parallel, Buffalo.....	10 @ 15
Wrenches—Coe's genuine.....	10 @ 15
Cast Iron Hollow.....	10 @ 15
Tin Plates—Add for each X.....	10 @ 15
10x11, 10x12, 10x13, 10x14, 10x15, 10x16, 10x17, 10x18, 10x19, 10x20, 10x21, 10x22, 10x23, 10x24, 10x25, 10x26, 10x27, 10x28, 10x29, 10x30, 10x31, 10x32, 10x33, 10x34, 10x35, 10x36, 10x37, 10x38, 10x39, 10x40, 10x41, 10x42, 10x43, 10x44, 10x45, 10x46, 10x47, 10x48, 10x49, 10x50, 10x51, 10x52, 10x53, 10x54, 10x55, 10x56, 10x57, 10x58, 10x59, 10x60, 10x61, 10x62, 10x63, 10x64, 10x65, 10x66, 10x67, 10x68, 10x69, 10x70, 10x71, 10x72, 10x73, 10x74, 10x75, 10x76, 10x77, 10x78, 10x79, 10x80, 10x81, 10x82, 10x83, 10x84, 10x85, 10x86, 10x87, 10x88, 10x89, 10x90, 10x91, 10x92, 10x93, 10x94, 10x95, 10x96, 10x97, 10x98, 10x99, 10x100, 10x101, 10x102, 10x103, 10x104, 10x105, 10x106, 10x107, 10x108, 10x109, 10x110, 10x111, 10x112, 10x113, 10x114, 10x115, 10x116, 10x117, 10x118, 10x119, 10x120, 10x121, 10x122, 10x123, 10x124, 10x125, 10x126, 10x127, 10x128, 10x129, 10x130, 10x131, 10x132, 10x133, 10x134, 10x135, 10x136, 10x137, 10x138, 10x139, 10x140, 10x141, 10x142, 10x143, 10x144, 10x145, 10x146, 10x147, 10x148, 10x149, 10x150, 10x151, 10x152, 10x153, 10x154, 10x155, 10x156, 10x157, 10x158, 10x159, 10x160, 10x161, 10x162, 10x163, 10x164, 10x165, 10x166, 10x167, 10x168, 10x169, 10x170, 10x171, 10x172, 10x173, 10x174, 10x175, 10x176, 10x177, 10x178, 10x179, 10x180, 10x181, 10x182, 10x183, 10x184, 10x185, 10x186, 10x187, 10x188, 10x189, 10x190, 10x191, 10x192, 10x193, 10x194, 10x195, 10x196, 10x197, 10x198, 10x199, 10x200, 10x201, 10x202, 10x203, 10x204, 10x205, 10x206, 10x207, 10x208, 10x209, 10x210, 10x211, 10x212, 10x213, 10x214, 10x215, 10x216, 10x217, 10x218, 10x219, 10x220, 10x221, 10x222, 10x223, 10x224, 10x225, 10x226, 10x227, 10x228, 10x229, 10x230, 10x231, 10x232, 10x233, 10x234, 10x235, 10x236, 10x237, 10x238, 10x239, 10x240, 10x241, 10x242, 10x243, 10x244, 10x245, 10x246, 10x247, 10x248, 10x249, 10x250, 10x251, 10x252, 10x253, 10x254, 10x255, 10x256, 10x257, 10x258, 10x259, 10x260, 10x261, 10x262, 10x263, 10x264, 10x265, 10x266, 10x267, 10x268, 10x269, 10x270, 10x271, 10x272, 10x273, 10x274, 10x275, 10x276, 10x277, 10x278, 10x279, 10x280, 10x281, 10x282, 10x283, 10x284, 10x285, 10x286, 10x287, 10x288, 10x289, 10x290, 10x291, 10x292, 10x293, 10x294, 10x295, 10x296, 10x297, 10x298, 10x299, 10x300, 10x301, 10x302, 10x303, 10x304, 10x305, 10x306, 10x307, 10x308, 10x309, 10x310, 10x311, 10x312, 10x313, 10x314, 10x315, 10x316, 10x317, 10x318, 10x319, 10x320, 10x321, 10x322, 10x323, 10x324, 10x325, 10x326, 10x327, 10x328, 10x329, 10x330, 10x331, 10x332, 10x333, 10x334, 10x335, 10x336, 10x337, 10x338, 10x339, 10x340, 10x341, 10x342, 10x343, 10x344, 10x345, 10x346, 10x347, 10x348, 10x349, 10x350, 10x351, 10x352, 10x353, 10x354, 10x355, 10x356, 10x357, 10x358, 10x359, 10x360, 10x361, 10x362, 10x363, 10x364, 10x365, 10x366, 10x367, 10x368, 10x369, 10x370, 10x371, 10x372, 10x373, 10x374, 10x375, 10x376, 10x377, 10x378, 10x379, 10x380, 10x381, 10x382, 10x383, 10x384, 10x385, 10x386, 10x387, 10x388, 10x389, 10x390, 10x391, 10x392, 10x393, 10x394, 10x395, 10x396, 10x397, 10x398, 10x399, 10x400, 10x401, 10x402, 10x403, 10x404, 10x405, 10x406, 10x407, 10x408, 10x409, 10x410, 10x411, 10x412, 10x413, 10x414, 10x415, 10x416, 10x417, 10x418, 10x419, 10x420, 10x421, 10x422, 10x423, 10x424, 10x425, 10x426, 10x427, 10x428, 10x429, 10x430, 10x431, 10x432, 10x433, 10x434, 10x435, 10x436, 10x437, 10x438, 10x439, 10x440, 10x441, 10x442, 10x443, 10x444, 10x445, 10x446, 10x447, 10x448, 10x449, 10x450, 10x451, 10x452, 10x453, 10x454, 10x455, 10x456, 10x457, 10x458, 10x459, 10x460, 10x461, 10x462, 10x463, 10x464, 10x465, 10x466, 10x467, 10x468, 10x469, 10x470, 10x471, 10x472, 10x473, 10x474, 10x475, 10x476, 10x477, 10x478, 10x479, 10x480, 10x481, 10x482, 10x483, 10x484, 10x485, 10x486, 10x487, 10x488, 10x489, 10x490, 10x491, 10x492, 10x493, 10x494, 10x495, 10x496, 10x497, 10x498, 10x499, 10x500, 10x501, 10x502, 10x503, 10x504, 10x505, 10x506, 10x507, 10x508, 10x509, 10x510, 10x511, 10x512, 10x513, 10x514, 10x515, 10x516, 10x517, 10x518, 10x519, 10x520, 10x521, 10x522, 10x523, 10x524, 10x525, 10x526, 10x527, 10x528, 10x529, 10x530, 10x531, 10x532, 10x533, 10x534, 10x535, 10x536, 10x537, 10x538, 10x539, 10x540, 10x541, 10x542, 10x543, 10x544, 10x545, 10x546, 10x547, 10x548, 10x549, 10x550, 10x551, 10x552, 10x553, 10x554, 10x555, 10x556, 10x557, 10x558, 10x559, 10x560, 10x561, 10x562, 10x563, 10x564, 10x565, 10x566, 10x567, 10x568, 10x569, 10x570, 10x571, 10x572, 10x573, 10x574, 10x575, 10x576, 10x577, 10x578, 10x579, 10x580, 10x581, 10x582, 10x583, 10x584, 10x585, 10x586, 10x587, 10x588, 10x589, 10x590, 10x591, 10x592, 10x593, 10x594, 10x595, 10x596, 10x597, 10x598, 10x599, 10x600, 10x601, 10x602, 10x603, 10x604, 10x605, 10x606, 10x607, 10x608, 10x609, 10x610, 10x611, 10x612, 10x613, 10x614, 10x615, 10x616, 10x617, 10x618, 10x619, 10x620, 10x621, 10x622, 10x623, 10x624, 10x625, 10x626, 10x627, 10x628, 10x629, 10x630, 10x631, 10x632, 10x633, 10x634, 10x635, 10x636, 10x637, 10x638, 10x639, 10x640, 10x641, 10x642, 10x643, 10x644, 10x645, 10x646, 10x647, 10x648, 10x649, 10x650, 10x651, 10x652, 10x653, 10x654, 10x655, 10x656, 10x657, 10x658, 10x659, 10x660, 10x661, 10x662, 10x663, 10x664, 10x665, 10x666, 10x667, 10x668, 10x669, 10x670, 10x671, 10x672, 10x673, 10x674, 10x675, 10x676, 10x677, 10x678, 10x679, 10x680, 10x681, 10x682, 10x683, 10x684, 10x685, 10x686, 10x687, 10x688, 10x689, 10x690, 10x691, 10x692, 10x693, 10x694, 10x695, 10x696, 10x697, 10x698, 10x699, 10x700, 10x701, 10x702, 10x703, 10x704, 10x705, 10x706, 10x707, 10x708, 10x709, 10x710, 10x711, 10x712, 10x713, 10x714, 10x715, 10x716, 10x717, 10x718, 10x719, 10x720, 10x721, 10x722, 10x723, 10x724, 10x725, 10x726, 10x727, 10x728, 10x729, 10x730, 10x731, 10x732, 10x733, 10x734, 10x735, 10x736, 10x737, 10x738, 10x739, 10x740, 10x741, 10x742, 10x743, 10x744, 10x745, 10x746, 10x747, 10x748, 10x749, 10x750, 10x751, 10x752, 10x753, 10x754, 10x755, 10x756, 10x757, 10x758, 10x759, 10x760, 10x761, 10x762, 10x763, 10x764, 10x765, 10x766, 10x767, 10x768, 10x769, 10x770, 10x771, 10x772, 10x773, 10x774, 10x775, 10x776, 10x777, 10x778, 10x779, 10x780, 10x781, 10x782, 10x783, 10x784, 10x785, 10x786, 10x787, 10x788, 10x789, 10x790, 10x791, 10x792, 10x793, 10x794, 10x795, 10x796, 10x797, 10x798, 10x799, 10x800, 10x801, 10x802, 10x803, 10x804, 10x805, 10x806, 10x807, 10x808, 10x809, 10x810, 10x811, 10x812, 10x813, 10x814, 10x815, 10x816, 10x817, 10x818, 10x819, 10x820, 10x821, 10x822, 10x823, 10x824, 10x825, 10x826, 10x827, 10x828, 10x829, 10x830, 10x831, 10x832, 10x833, 10x834, 10x835, 10x836, 10x837, 10x838, 10x839, 10x840, 10x841, 10x842, 10x843, 10x844, 10x845, 10x846, 10x847, 10x848, 10x849, 10x850, 10x851, 10x852, 10x853, 10x854, 10x855, 10x856, 10x857, 10x858, 10x859, 10x860, 10x861, 10x862, 10x863, 10x864, 10x865, 10x866, 10x867, 10x868, 10x869, 10x870, 10x871, 10x872, 10x873, 10x874, 10x875, 10x876, 10x877, 10x878, 10x879, 10x880, 10x881, 10x882, 10x883, 10x884, 10x885, 10x886, 10x887, 10x888, 10x889, 10x890, 10x891, 10x892, 10x893, 10x894, 10x895, 10x896, 10x897, 10x898, 10x899, 10x900, 10x901, 10x902, 10x903, 10x904, 10x905, 10x906, 10x907, 10x908, 10x909, 10x910, 10x911, 10x912, 10x913, 10x914, 10x915, 10x916, 10x917, 10x918, 10x919, 10x920, 10x921, 10x922, 10x923, 10x924, 10x925, 10x926, 10x927, 10x928, 10x929, 10x930, 10x931, 10x932, 10x933, 10x934, 10x935, 10x936, 10x937, 10x938, 10x939, 10x940, 10x941, 10x942, 10x943, 10x944, 10x945, 10x946, 10x947, 10x948, 10x949, 10x950, 10x951, 10x952, 10x953, 10x954, 10x955, 10x956, 10x957, 10x958, 10x959, 10x960, 10x961, 10x962, 10x963, 10x964, 10x965, 10x966, 10x967, 10x968, 10x969, 10x970, 10x971, 10x972, 10x973, 10x974, 10x975, 10x976, 10x977, 10x978, 10x979, 10x980, 10x981, 10x982, 10x983, 10x984, 10x985, 10x986, 10x987, 10x988, 10x989, 10x990, 10x991, 10x992, 10x993, 10x994, 10x995, 10x996, 10x997, 10x998, 10x999, 10x1000, 10x1001, 10x1002, 10x1003, 10x1004, 10x1005, 10x1006, 10x1007, 10x1008, 10x1009, 10x1010, 10x1011, 10x1012, 10x1013, 10x1014, 10x1015, 10x1016, 10x1017, 10x1018, 10x1019, 10x1020, 10x1021, 10x1022, 10x1023, 10x1024, 10x1025, 10x1026, 10x1027, 10x1028, 10x1029, 10x1030, 10x1031, 10x1032, 10x1033, 10x1034, 10x1035, 10x1036, 10x1037, 10x1038, 10x1039, 10x1040, 10x1041, 10x1042, 10x1043, 10x1044, 10x1045, 10x1046, 10x1047, 10x1048, 10x1049, 10x1050, 10x1051, 10x1052, 10x1053, 10x1054, 10x1055, 10x1056, 10x1057, 10x1058, 10x1059, 10x1060, 10x1061, 10x1062, 10x1063, 10x1064, 10x1065, 10x1066, 10x1067, 10x1068, 10x1069, 10x1070, 10x1071, 10x1072, 10x1073, 10x1074, 10x1075, 10x1076, 10x1077, 10x1078, 10x1079, 10x1080, 10x1081, 10x1082, 10x1083, 10x1084, 10x1085, 10x1086, 10x1087, 10x1088, 10x1089, 10x1090, 10x1091, 10x1092, 10x1093, 10x1094, 10x1095, 10x1096, 10x1097, 10x1098, 10x1099, 10x1100, 10x1101, 10x1102, 10x1103, 10x1104, 10x1105, 10x1106, 10x1107, 10x1108, 10x1109, 10x1110, 10x1111, 10x1112, 10x1113, 10x1114, 10x1115, 10x1116, 10x1117, 10x1118, 10x1119, 10x1120, 10x1121, 10x1122, 10x1123, 10x1124, 10x1125, 10x1126, 10x1127, 10x1128, 10x1129, 10x1130, 10x1131, 10x1132, 10x1133, 10x1134, 10x1135, 10x1136, 10x1137, 10x1138, 10x1139, 10x1140, 10x1141, 10x1142, 10x1143, 10x1144, 10x1145, 10x1146, 10x1147, 10x1148, 10x1149, 10x1150, 10x1151, 10x1152, 10x1153, 10x1154, 10x1155, 10x1156, 10x1157, 10x1158, 10x1159, 10x1160, 10x1161, 10x1162, 10x1163, 10x1164, 10x1165, 10x1166, 10x1167, 10x1168, 10x1169, 10x1170, 10x1171, 10x1172, 10x1173, 10x1174, 10x1175, 10x1176, 10x1177, 10x1178, 10x1179, 10x1180, 10x1181, 10x1182, 10x1183, 10x1184, 10x1185, 10x1186, 10x1187, 10x1188, 10x1189, 10x1190, 10x1191, 10x1192, 10x1193, 10x1194, 10x1195, 10x1196, 10x1197, 10x1198, 10x1199, 10x1200, 10x1201, 10x1202, 10x1203, 10x1204, 10x1205, 10x1206, 10x1207, 10x1208, 10x1209, 10x1210, 10x1211, 10x1212, 10x1213, 10x1214, 10x1215, 10x1216, 10x1217, 10x1218, 10x1219, 10x1220, 10x1221, 10x1222, 10x1223, 10x1224, 10x1225, 10x1226, 10x1227, 10x1228, 10x1229, 10x1230, 10x1231, 10x1232, 10x1233, 10x1234, 10x1235, 10x1236, 10x1237, 10x1238, 10x1239, 10x1240, 10x1241, 10x1242, 10x1243, 10x1244, 10x1245, 10x1246, 10x1247, 10x1248, 10x1249, 10x1250, 10x1251, 10x1252, 10x1253, 10x1254, 10x1255, 10x1256, 10x1257, 10x1258, 10x1259, 10x1260, 10x1261, 10x1262, 10x1263, 10x1264, 10x1265, 10x1266, 10x1267, 10x1268, 10x1269, 10x1270, 10x1271, 10x	

Steel.

THREE
1st CLASS PRIZE MEDALS.
CLASSES 1, 21, 22.
Great Exhibition of Industry,
LONDON, 1851.

MEDAL OF HONOUR,
SOCIETY OF ARTS & INDUSTRY,
LONDON, 1856.

1st CLASS
PRIZE MEDAL, CLASS 1st
UNIVERSAL
EXHIBITION OF INDUSTRY
PARIS, 1855.

COCKER BROTHERS,

SUCCESSORS TO
SAM'L COCKER & SON,
(Established 1752.)
SHEFFIELD, ENGLAND

MANUFACTURERS OF
CAST, SHEAR, SHEET, AND BLISTER STEEL, OF EVERY DESCRIPTION.
BEST CAST STEEL WIRE, ADAPTED SPECIALLY FOR MECHANICAL PURPOSES;
Also for ROPES, NEEDLES, FISH HOOKS, PINS, CRINOLINE, &c.

BEST CAST STEEL FILES, SAWS, EDGE TOOLS,
HACKLES, GILLS, CARD CLOTHING, CARD TEETH, HACKLE AND GILL PINS,
FISH HOOKS, NEEDLES, &c.

ALSO

GENERAL MERCHANTS.
Agent, JONATHAN HATTERSLEY, Cincinnati, Ohio

WM. JESSOP & SONS,

MANUFACTURERS OF
STEEL,
AND IMPORTERS OF IRON
SHEFFIELD, ENGLAND.

PRINCIPAL DEPOTS:
NEW YORK, Nos. 91 and 93 John Street. BOSTON Nos. 133 and 135 Federal Street.

AGENCIES:
PHILADELPHIA, Jas. C. Hand & Co. PROVIDENCE, Cornett, Nightingale & Co.
CHICAGO, Greiner, Adams & Co. ST. LOUIS, Henry Bakewell & Sons.
CINCINNATI, Augustus Wessel. NEW ORLEANS, Folger & Co.
SAN FRANCISCO, Russell & Erwin Manufacturing Co.

F. W. MOSS,

Successor to JOSHUA MOSS & GAMBLE BROTHERS,
MANUFACTURER AND IMPORTER OF

STEEL AND FILES.

Principal Depots: 80 John Street, New York, and 512 Commerce Street, Philadelphia.
MOSS & GAMBLE SUPERIOR C. S. "FULL WEIGHT" FILES,
Cast Steel Hammers and Sledges. Also, "M. & G." Anvils and Vis-s.

WARRANTED CAST STEEL, especially adapted for DIES and TURN-
ING TOOLS, DRILLS, COLD CHISELS,
PUNCHES and all kinds of MACHINISTS' TOOLS.
Celebrated Improved Mid-Centre Cast Steel, for Taps, Reamers, and Milling Tools.
Warranted not to crack in hardening Taps of any size.
Swede Spring Steel, especially adapted to Locomotive and Railway Car Springs.
English Spring and Plow Plate Steel.
Also, manufacturer of

Sheet Cast Steel, Shear, German, Round Machinery, Hammer, Fork and Shovel Steel
And GENERAL MERCHANT.

A. M. F. WATSON, General Agent.

WILSON HAWKSWORTH, ELLISON & CO.,

MANUFACTURERS OF

STEEL, STEEL WIRE, &C.,

AND GENERAL MERCHANTS,

CARLISLE WORKS, SHEFFIELD, ENGLAND.

AGENCIES:

New York, 72 John Street.
Philadelphia, 505 Commerce Street.
Boston, 6 and 8 Liberty Square.

BARROW HÆMATITE STEEL COMPANY,

LIMITED.

BARROW IN FURNESS,

LANCASHIRE, England

MANUFACTURERS OF

Steel Rails, Tyres, Wheels,
Axles, Shafting, Boiler & Ship Plates, Bessemer Pig Iron, etc., etc.

CHAS. CONGREVE & SON,

Sole Agents for the United States,
104 & 106 John Street, opposite Cliff Street, NEW YORK.

J. & RILEY CARR,

MANUFACTURERS OF SUPERIOR

STEEL

For Tools, Cutlery, Saws, Files, Augers, Gimblets, &c.; Sheet Cast Steel for
SPRINGS AND STAMPING COLD;

ALSO THE CELEBRATED

DOG BRAND FILES.

Unsurpassed, if equalled, in quality.

Bailey Lane Works, Sheffield, England.

Warehouse 82 John St., New York.

Registered 1810.

HENRY MOORE, Attorney.

Steel.

SANDERSON BROTHERS & COMPANY,

(LIMITED)

MANUFACTURERS OF THE

CELEBRATED CAST STEEL,

WARRANTED MOST SUPERIOR FOR TOOLS.

DARNALL WORKS,
ATTERCLIFFE FORGE,
WEST STREET WORKS,

SHEFFIELD, ENGLAND.

IMPORTERS OF FILES,

AND

AGENTS FOR ARMITAGE'S GENUINE MOUSEHOLE ANVILS.

NEW YORK, Edward Frith, 16 Cliff.

BOSTON, H. L. Richards, 18 Batterymarch.

PHILADELPHIA, Wm. H. Sowers.

CLEVELAND, O., Cleveland, Bro. & Co.

NEW ORLEANS, Rich'd Rhodes, 71 Camp.

BALTIMORE, Md., Wm. H. Cole.

MONTREAL, Saint Paul St.

NEW HAVEN, Ct., Atwater, Wheeler & Co.

FRANCIS HOBSON & SON,

97 John Street, NEW YORK,

Sole Manufact'rs of "CHOICE" Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

JOHN HOGAN, Agent.

S. & C. WARDLOW,

MANUFACTURERS OF THE CELEBRATED

Cast and Double Shear STEEL,

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table, Carving,
Butcher and Shoe Knives, Turning Tools, Dies, Files, Clock or other Springs,
Saws and Tools of every variety.

SHEFFIELD, ENGLAND.

Office of S. & C. WARDLOW, 13 Gold Street, New York.

*In calling the attention of consumers of Steel, in
any of the varieties above enumerated, we would respectfully assure
them of our ability to supply an article that cannot be equalled in
quality, temper, and adaptability in all respects to the various purposes
for which it may be required. Half a century of practical expe-
rience in all departments of Steel manufacture, a long established
reputation in England, and the Command of Europe, and in the Eastern
States principally of this Country, encourage us to solicit a universal
trial of our Steel for the above or other purposes for which a first
class material in quality, temper, and durability is needed.*

G. SANDERSON & CO.,

Manufacturers of all descriptions of

STEEL.

Bailey Street and Broad Lane Steel Works, SHEFFIELD, ENGLAND.

Particular attention is paid to quality and temper for

Files, Saws, Table and Pocket Cutlery, Augers, Shovels, &c.

ALSO STEEL of superior quality for Turning Tools, Taps, Dies, Drills, &c.

Hot and Cold Rolled Sheets for Clock Springs, Corset Clasps, Pens, &c.

Makers of the Celebrated ROCK BORING DRILL STEEL.

Warehouse, 57 John Street, New York.

JOHN A. GRISWOLD & CO.,

Troy, N. Y.,

Office in New York City, 56 BROADWAY.

MANUFACTURERS OF

Bessemer Railway Steel,

MERCHANT BARS, TIRE AND SHAFTING,

Railroad Iron, Pig Iron, Merchant and Ship Iron,

AGENCIES IN BOSTON AND PHILADELPHIA.

AULTMAN STEEL CO.,

Canton, Ohio,

MANUFACTURE

WELDING TOOL STEEL,

Warranted superior to any manufactured in this or any other country.

A. J. NELLIS & CO., Pittsburgh, Pa.

MANUFACTURERS OF

Agricultural Steels
and Irons

OF ALL KINDS AND SIZES.
BEVELED, BOLTED, FIN-
ISHED AND TEMPERED TO
SUIT ALL KINDS OF SOIL.

With the exception of our Horse Hay Fork and Fixtures we make no
complete implement. Agricultural Steels and Irons we make a specialty.
From the universal approval our goods have secured by actual test in the
hands of Implement Makers and Farmers from the Atlantic to the Pacific,
and with our facilities, experience and improvements, we frankly assure
the Trade of our ability to meet the requirements of the age. All of our
Steel Goods have imprint of our Trade Mark.

Nellis'
Original Harpoon Horse Hay
Fork Improved.
Nellis'

Grapple and Pullers
Send for Pamphlet.

Steel.

Sheffield Steel Works.

(Established in 1848.)

SINGER, NIMICK & CO.

Pittsburgh, Pa.,
Manufacturers of Extra Quality Tool

CAST STEEL,

Patent Rolled

SAW PLATES,

All descriptions of Cast and German

Spring and Plow Steel

Elliptic and Side Springs, Seat Springs,

AXLES, STEEL TIRE,

Plow Wings, Shares, Cultivators,

Reaper Bars, Crow Bars, &c., &c.

Warehouse, 63 Water and 100 First Streets.

ISAAC JENKS & SONS,

Minerva & Beaver Iron & Steel Works,

Wolverhampton, England,

MANUFACTURERS OF

"Jenks" Spring Steel, Cast and

Swedes Spring Steel,

TIRE, TOE CORK, SLEIGH SHOE,

BLISTER & FLOW STEEL.

Also, Plow and other Iron.

VAN WART & MCCOY, Agents,

43 Chambers St., New York.

A full assortment of "Jenks" Spring Steel in stock.

MILLER, BARR & PARKIN,

Crescent Steel Works,

PITTSBURGH, PA.,

Manufacturers of all descriptions of

STEEL

EQUAL TO ANY IN THE MARKET.

Office.....339 Liberty St.

PITTSBURGH, PA.

Gunpowder.

GUNPOWDER.

DUPONT'S

Sporting, Shipping, and Mining

POWDER.

DUPONT'S GUNPOWDER MILLS,

ESTABLISHED IN 1801.

Have maintained their great reputation for 70 years. Manufacture the

Celebrated Eagle Ducking, Eagle Rifle and Diamond Grain Powder.

Also, SPORTING, MINING SHIPPING, AND BLAST-
ING POWDER

of all kinds and descriptions.

For sale in all parts of the country. Represent-
ed by

F. L. KNEELAND,

70 Wall Street, NEW YORK.

GUN-POWDER

LAFLIN & RAND POWDER CO.

21 Park Row, New York,

invite the attention of the Hardware Trade to
their facilities for delivering

BLASTING, MINING and RIFLE

POWDER

IN EVERY PART OF THE UNITED STATES,
from having agencies and magazines at all prominent
points, besides our works at

Newburg, Saugerties, Kingston, and
Catskill, N. Y.; Scranton, Carbon-
dale and Pottsville, Pa.; Balti-
more, Md., and Plattsville, Wis.

The superiority is well known of our brands
Rifle Powder:

Orange Rifle, Orange Ducking
Lightning, Audubon.

SAFETY-FUSE at wholesale.

Steel.

HUSSEY, WELLS & CO.

MANUFACTURERS OF ALL DESCRIPTIONS OF

CAST STEEL,

INCLUDING

Best Refined Steel for Edge Tools.

PARTICULAR ATTENTION PAID TO THE MANUFACTURE OF STEEL FOR

Railroad Supplies, Homogeneous Plates

FOR LOCOMOTIVES, BOILERS AND FIRE BOXES.

Smoke-Stack Steel, Cast Steel Forgings for Crank Pins, Car Axles, &c.

ALSO, MANUFACTURERS OF THE CELEBRATED BRAND

"Hussey, Wells & Co. Cast Spring Steel,"

For Elliptic Springs for Railroad Cars & Locomotives.

PENN AND SEVENTEENTH STS., PITTSBURGH, PA.

BRANCH OFFICES:

30 Gold St., New York. 139 & 141 Federal St., Boston. 88 Michigan Ave., Chicago.

Pittsburgh Steel Works

ESTABLISHED IN 1845.

ANDERSON & WOODS,

MANUFACTURERS OF

BEST REFINED CAST STEEL,

Cast and German Plow and Spring Steel,

FIRST AVE. AND ROSS ST., PITTSBURGH.

BRANCH HOUSES:

Nos. 74 and 75 North Street, Boston. C. H. WHITNEY & SON, 142 Greenwich Street, New York.
W. F. POTTS, SON & CO., 125 Market Street, Philadelphia.

CHROME STEEL COMPANY,

MANUFACTURERS OF

CHROME CAST STEEL,

WARRANTED SUPERIOR TO ANY STEEL IN THE MARKET—EITHER ENGLISH OR AMERICAN—FOR EVERY PURPOSE.

Works and Offices—Kent Avenue and Keap Street, Brooklyn, E. D., N. Y.

Principal Agencies:

Hall, Kimbark & Co., Chicago, Ill. Harris, Rice & Co., St. Louis, Mo. Horace P. Tobey, Boston, Mass.
Cleveland, Brown & Co., Cleveland, Ohio. Wood & Leggat, Hamilton, Ont.

LABELLE STEEL WORKS

REITER, LAVELY & CO.,

MANUFACTURERS OF ALL KINDS OF

STEEL.

Also, Springs, Axles, Rake Teeth, &c.

OFFICE & WORKS, Ridge, Lighthill & Belmont Sts., & Ohio River, Allegheny.

Post Office Address, Pittsburgh, Pa.

New Jersey Steel and Iron Company.

Trenton, N. J.,

Represented by COOPER, HEWITT & CO., 17 Burling Slip, New York,

MAKERS OF

ROLLED IRON BEAMS.

Channel Bars, the Trenton Steel Top Rails, &c., &c. Refined Iron, Brazier and Wire Rods.

ALSO,

THE MARTIN STEEL,

For Machinery Uses and Fire-Box Plates.



Reese, Graft & Woods.

D. G. GAUTIER & CO.,

MANUFACTURERS OF

Hammered and Rolled STEEL of every description

JERSEY CITY, NEW JERSEY.

DUDLEY G. GAUTIER.

JOSEPH H. GAUTIER.

CHICAGO.

(Reported by Markley, Alling & Co.)

Aggricultural Implements—	
scythes—Dunn Edge Tool Co.	dis 25
Hay and Manure Forks—Ottago extra C. S.	dis 25
Hay and Garden Forks—Jackson and Ottago	dis 25
scythes—Dunn Edge Tool Co.	dis 25
scythes and Bush Scythes—	dis 25
Harvest Rakes and Barley Forks—	dis 25
Revolving Horse Rakes—	dis 25
Handed—Fork and Shovel—	dis 25
Cradles—Stillington, Cooley & Co.	dis 25
Genuine Morgan	dis 25

Augers and Bits—	
Ives' extra C. S.	dis 20
Jennings'—dis 25	
Cook's—dis 25	

Snell's—dis 10	
Car Bits—dis 10	

Axes—Amoskeag Yankee—	dis 14 00
Amoskeag Crescent—	dis 14 00
Hunt's Yankee—	dis 14 00
Kennebec Yankee—	dis 14 00
Lippincott—	dis 14 00

Crown—	dis 14 00
Jefford's Silver Steel—	dis 14 00
Red Warrior, Beveled—	dis 14 00
Kennebec, Handled—	dis 14 00
Boy's, Handled—	dis 14 00

Belts—Carriage and Tire—	dis 60 25
Cast Fast Joint, Narrow—	dis 20 15
Cast Fast Joint, Broad—	dis 20 15

Butts—Cast Fast Joint, Narrow—	dis 10 5
Cast Fast Joint, Broad—	dis 10 5

Loose Joint—	dis 10 5
Pin, Reversible—	dis 10 5

Silver Tipper—	dis 10 5
Wrought Narrow, Fast Joint—	dis 10 5

Loose—	dis 10 5
Table—	dis 10 5

Garretson's Blind Butts, Wood—	dis 20 25
Brick—dis 20 25	
Parker's—dis 20 25	

Casters—Iron Plate—	dis 20 5
Brass Wheel Plate—	dis 20 5
Porcelain Wheel Plate—	dis 20 5

Iron Wheel Bed—	dis 20 5
Chisels—Butcher's—	dis 20 5
Long Paring—	dis 20 5

Withey Socket Framing—	dis 20 5
Flimmer—	dis 20 5
Corner—	dis 20 5

Silks—	dis 20 5
Coffee Mills—	dis 20 5

Box 55 Cast Steel—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 Bottom—	dis 13 00

Box 55 Top—	dis 13 00
Box 55 Middle—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

Box 55 Back—	dis 13 00
Box 55 Side—	dis 13 00
Box 55 End—	dis 13 00

Box 55 Corner—	dis 13 00
Box 55 Edge—	dis 13 00
Box 55 Face—	dis 13 00

ST. LOUIS.

(Reported by Messrs. Birge & Co.)

Applis—Armlage—	dis 15 00
Winckinson's—	dis 15 00

Apple Parers—Conqueror—	dis 15 00
Lighting—	dis 15 00

Augers and Bits—	dis 15 00
Ives'—	dis 15 00

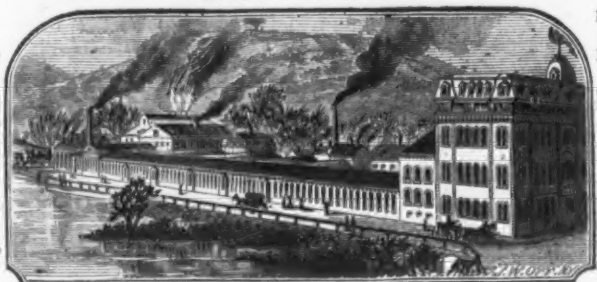
Jennings'—	dis 15 00
Cook's—	dis 15 00

Machinery, &c.

Putnam Machine Company,

MANUFACTURERS OF

Engine
Lathes,
Iron
Planers,
Upright
Drills,
Traverse
Drills,
Milling
Machines,
Gear
Cutters,
&c.



Bolt
Cutters,
Pulley
Lathes,
Slotting
Machines,
Nut
Tapping
Machines,
Boring
Machines,
Pattern
Lathes,
&c.

MACHINISTS' TOOLS,

Patent Regulating Cut-off Steam Engines,
Woodworth Planing Machines, Shafting, &c.
FITCHBURG, MASS, U. S. A.

BUSH HILL IRON WORKS,

Corner 16th & Buttonwood Streets,
PHILADELPHIA.

JAMES MOORE,

(Successor to MATTHEWS & MOORE,)

Engineer, Machinist, Founder and Boilermaker,

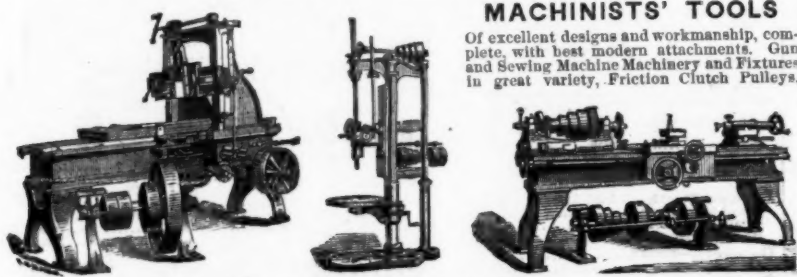
CASTINGS of every description.

ROLLING MILL AND FURNACE EQUIPMENTS COMPLETE.

Rolls Turned for Rails, Beams, Angles, and all shapes for Iron, Steel, or
Composition Metals.

Sugar Mill, Saw Mill and Crist Mill Machinery,
AND MILLWRIGHTING IN GENERAL.

BOILERS—FLUE, TUBULAR AND CYLINDER, and all kinds of
TANK AND PLATE IRON WORK.



Water-Power Organ Blowing Apparatus, Special Machinery, &c., made by
THE PRATT & WHITNEY COMPANY, Hartford, Conn.

Established 1848.

WM. SELLERS & CO.,

1600 Hamilton Street, PHILADELPHIA.,

Engineers, Iron Founders and Machinists.

RAILWAY SHOP EQUIPMENTS.

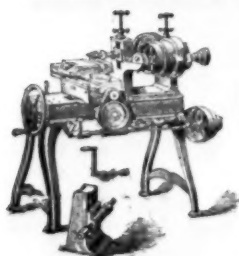
Our Steam Hammers, Lathes, Planers, Drills and Bolt Cutters
Are of Improved and Patented Construction.

Railway Turning and Transfer Tables,
SHAFTING & MILL GEARING, a specialty.

Pivot Bridges.

GIFFARD'S INJECTOR--IMPROVED, SELF-ADJUSTING.

LINCOLN'S MILLING MACHINES.

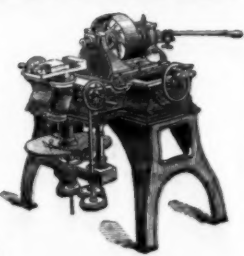


PHENIX IRON WORKS.

GEO. S. LINCOLN & CO.

HARTFORD, CONN.

Machinists' Tools,

AND
LINCOLN'S FRICTION CLUTCH PULLEYS.

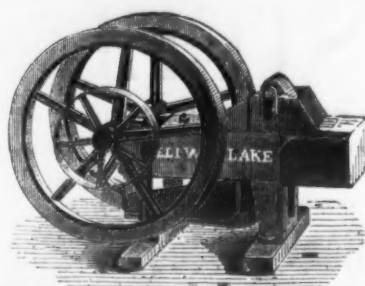
Higginum Manu'g Co.,
Higginum, Ct., Manufacturers of all kinds of
Plows, Hay Spreaders and
Agricultural Implements in general.
Storehouse, Warehouse,
and all kinds of Trucks a specialty.
Orders solicited.



Machinery, &c.

IMMENSE SAVING OF LABOR.

BLAKE'S



PATENT

CRUSHING MACHINE

for reducing to fragments (of any required size) all kinds of

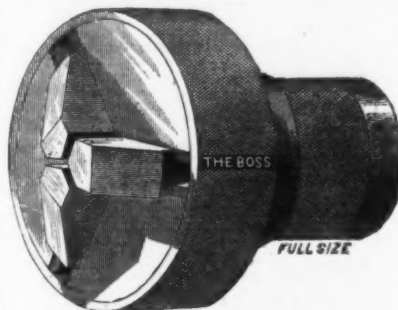
Hard and Brittle Substances, such as
ROCKS, ORES, MINERALS AND DRUGS.

For Circulars containing particulars and numerous testimonials, for Price Card, or for other information in the
premises, address

BLAKE CRUSHER CO., New Haven, Conn.,

or, E. S. BLAKE, Pittsburgh, Pa.

Persons visiting New York City can see a Crusher in operation at 137 Elm Street, where M. B. WASHBURN will
give information and prices and receive orders.



Patented Dec. 24th, 1873.

The BOSS Drill Chuck

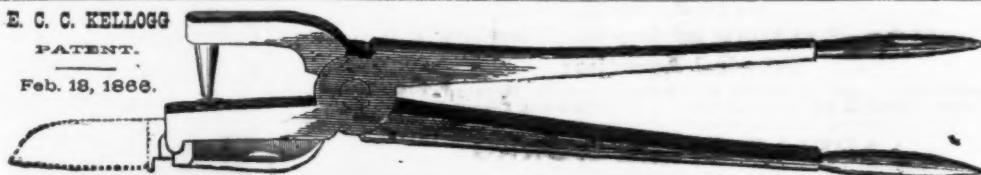
is warranted to be the best and most perfect made Chuck in use. It
holds from 0 to three-eighths inch, and is truly the Boss Chuck.
Every piece is made of Forged Steel, and finished to a Gauge. Give
it a trial and you will be satisfied; if not, return it at my expense, and
your money will be refunded. Address

A. F. Cushman,

Manufacturer of all kinds of Lathe Chucks,
HARTFORD, CONN.

Orders from the trade solicited.

E. C. C. KELLOGG
PATENT.
Feb. 18, 1866.



COMBINATION BELT PUNCH,

Pronounced by those who have used them the handiest and most desirable tool in use of its kind. As will be seen, the combination consists of

Belt Punch, Knife and Awl,

Also, Needle for Lacing Rubber Belting, so combined that each tool does its specific work and not interfere with either of the others.

E. C. C. KELLOGG & CO., Hartford, Conn.

or Sale by Hardware Dealers generally.

THORNE, DeHAVEN & CO.,

Twenty-first Street, above Market

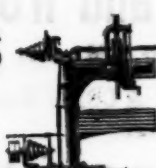
PHILADELPHIA.

PATENT

PORTABLE DRILLING MACHINES

PATENT

RADIAL DRILLING MACHINES.



FLUTING MACHINES,

Eureka, Peerless and K. F. M. Improved,

PIANO STOOL SCREWS.

LOWERRE & TUCKER, 23 Railroad Place, Newark, N. J.

Send for Price List.



Contractors for
River, Harbor and Bank
Improvements,
Steam Dredging Machines,
Steam Tugs, etc.

TAWES & HARTMAN,
ENGINEERS,

1235 and 1237 North Front St., Phila.

Blast Furnaces and Rolling Mills

DESIGNED AND CONSTRUCTED.

Drawings for Machinery made, and Estimates fur-
nished. Special Fittings for Blast Furnaces on
hand and made to order.

Tawes & Hartman's Patent Air Hoist.

AGENTS FOR

KENT'S PATENT HOT BLAST PIPE.

Thomas' Pat. Safety Lift for Bell & Hopper,
prevent explosions. Also,
HORTON'S PATENT WATER BREAST.

James S. Patterson,
Designer & Engraver
on Wood,

21 Spruce Street, NEW YORK.

Incorporated 1838.

NATIONAL
Fire Insurance Company,

in the city of New York,

Office, No. 52 Wall Street.

Henry T. Brown, Pres. Henry H. Hall, Secy.

NATIONAL
INSURANCE AGENCY,

No. 52 Wall Street,

Represents the following well known Fire Insur-

ance Companies:

Cash Assets.
Union, of Bangor - \$460,000
Home, of Columbus 800,000
St. Paul, of St. Paul 580,000
National, of New York 290,000

\$2,130,000

Best out of Town and Local Companies.

Loans adjusted and Paid by the
Officers of a Local Co.

Henry T. Brown, Agents.
Henry H. Hall, John W. Craig, Surveyor.

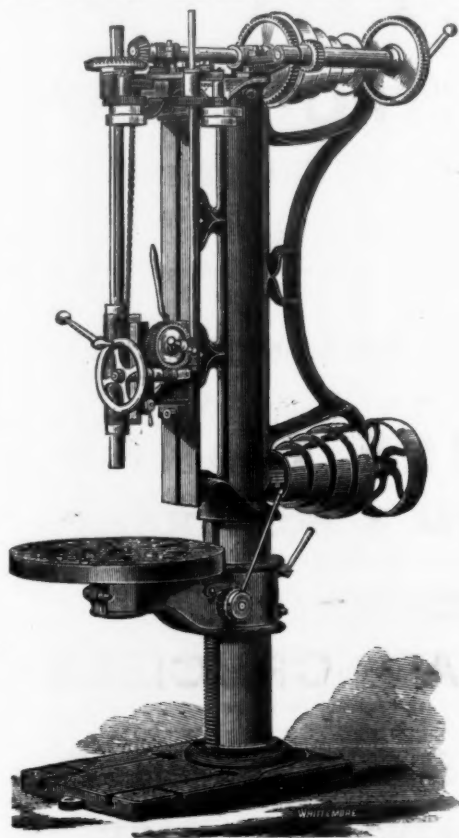
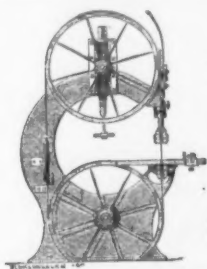
Machinery, &c.

**ANDREW WATSON,
MACHINIST and ENGINEER,**Nos. 537 & 539 Dickinson Street,
Near Trenton Avenue, 19th Ward, PHILADELPHIA.Builder of *Fertile Steam Engines and Boilers*, peculiar for their economy of space and fuel, safety and quickness in raising steam. Also, sole manufacturer of *Improved Balance Governor* with automatic stop, *Balance Slide Valve*, *Safety Valves*, *Stop Valves*, *Improved Pistons for Engines*, which require no setting by the Engineer. Engine Builders and Dealers supplied with *Governors*, *Stop Valves*, *Safety Valves*, &c., &c. These governors are fitted up in the very best manner, with brass Valves and Seats, which will not corrode or stick fast. Guaranteed to regulate under any irregular load which an Engine is subject to. Millwright work executed, and Machinery in general satisfactorily repaired. Engines Indicated Promptly and with the Greatest Accuracy.**EDWIN HARRINGTON,
MANUFACTURER OF****ENGINE LATHES,
AND OTHER MACHINISTS' TOOLS,**

Corner of North Fifteenth St. & Pennsylvania Ave., Philadelphia

BAND SAW MACHINERYFor Ship & Car Builders, Agricultural, Wagon,
Pattern and Cabinet Shops.**"Perin" French Band Saw Blade**

KEPT IN STOCK.

RICHARDS, LONDON & KELLEY,
22nd above Arch, PHILADELPHIA.**P. BLAISDELL & CO.,**

Worcester, Mass.,

MANUFACTURERS OF

Engine Lathes & Drill Presses.**RICHARD DUDGEON,**No. 24 Columbia Street, New York,
MAKER AND PATENTEE OF**Hydraulic Jacks and Punches,****ROLLER TUBE EXPANDERS****And Direct-Acting Steam Hammers.**

Communications by letter will receive prompt attention.

JACKS for Pressing on Car Wheels or CRANK PINS made to order.

The Bessemer Steel Works,
of John A. Griswold & Co.,

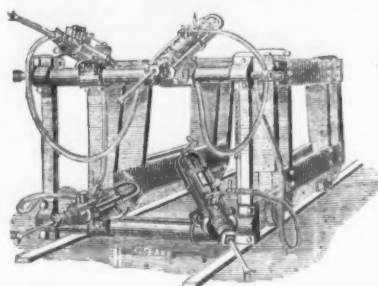
Troy, N. Y., May 3, 1872.

B. F. Sturtevant, Boston, Mass.,Dear Sir,—We have changed your No. 8 for
your No. 9. Pressure Blower. The time
in melting is about the same with either Blower.
We are melting 225,000 lbs. (112½ tons.)
Pig Iron daily, (20 hours running time.)
It works well.**BARNEY MEE, Supt.****The Yale Iron Works,**

NEW HAVEN, CONN., Manufacturers of

STEAM ENGINES of all kinds,With or without *Rider's Patent Variable Cut-off*. Boilers,
Heaters, Pumps, Gauges; in fact everything required to complete
an Engine; Lathes, Planers, Rubber and Power Presses; all
kinds of Iron Castings for Architectural and other purposes;
Wrought Iron Girders; Machine Forgings; Stable Trimmings;
Drinking and Fire Hydrants; Pulleys and Shafting; Pipe Fitting
and JOBBING IN ALL ITS BRANCHES.Agents for Ames' Portable Engines, Judson's Patent Governor,
Fairman & Co.'s Lathe Chuck, and Water's Patent Heater.
WM. B. PARDEE, Pres. and Treas. GEO. E. LUM, Secy.

Machinery, &c.

**THE BURLEIGH ROCK DRILLS
AND
AIR COMPRESSORS**are pronounced by the most eminent engineers in the country as a necessity for the practical working
of all *Mines, Tunnels, Quarries, &c.* The above machinery is the only machinery that has ever done
any successful Tunnel work in America. (They are to be used on the St. Gothard Tunnel, Switzerland,
Tunnel 13 miles long.) We refer to the following eminent engineers and works:Gen. Newton, U. S. A. Hell Gate Tunnels, L. I.
Mess. Shanley, Hoosier Tunnel, Mass.
J. Dutton Steele, Nesquehoning Tunnel, Pa.
Col. Roebling, Fourth Avenue Work, N. Y.
East River Bridge Company, N. Y.

Send for Illustrated Pamphlet to

Burleigh Rock Drill Company,
FITCHBURGH, MASS.**FERRIS & MILES,**24th & WOOD STS.,
(Take Arch or Race & Vine Street Cars.)

PHILADELPHIA.

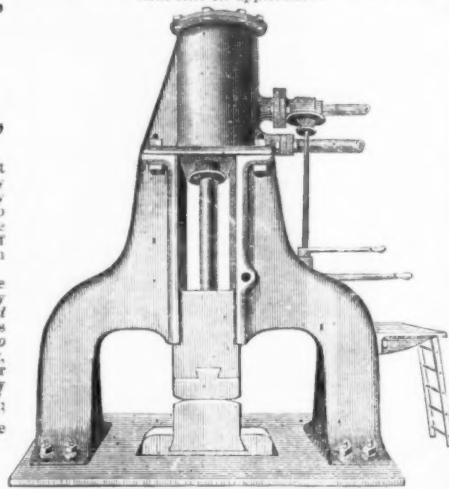
Steam Hammers, Drops, Etc.,

With our latest Improvements.

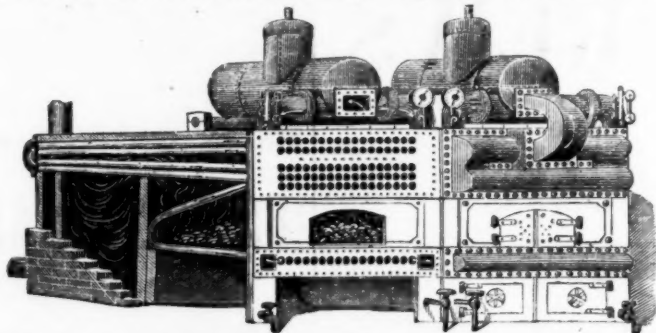
60 different styles and sizes, extra long or short
stroke, from 100 lbs. upward, suited to every
kind of work in Iron and Steel. The heavy
Ram, guided in broad bearings close down to
its work, produces the greatest effect with the
least expenditure of steam, ensures accuracy of
the work, and saves piston and cylinder from
the shock of impact.Our patent balanced valve gear of but three
moving pieces, takes up its lost motion by
gravity. It reduces to a minimum, the required
steam power, friction, wear and repair. Boys
of 12 easily manage it by a single lever with no
extra gear: strike dead or elastic blows, long,
short, light, quick, slow, heavy, by hand or
automatic, at will. The hammer-man, also, by
our New Patent Treadle, can work it himself,
with his foot, and stop or start "on the blow."
The hammer always stop, ing up, ready to strike
again.

W. H. CUNNINGHAM, Salesman.

We employ no agents.

Photographs, Prices, Foundation Drawings, and full descrip-
tions sent on application.**THESE BOILERS**

Have stood the most severe tests for the past eight years without an accident.

**SAFETY STEAM BOILER MFG. CO.,**

THOMAS VERNER, Proprietor,

MANUFACTURER OF

Non-Explosive Boilers, Steam House Heaters, Engines & General Machine Work

These Boilers are safe from explosion: are very durable and economical, both in fuel and repairs.
They have few joints or connections, and none of these in fire surface, perfectly free expansion; the cir-
culation of water through the tubes keeps them perfectly clear of scale and sediment.

WORKS: 30th and Chestnut Streets, PHILADELPHIA.

Morse Twist Drill and Machine Company,

New Bedford, Mass.,

SOLE MANUFACTURERS OF

MORSE PATENT STRAIGHT-LIP INCREASE TWIST DRILL.

BEACH'S PATENT SELF-CENTERING CHUCK.

ALSO MANUFACTURE

SOLID AND SHELL REAMERS.

All Tools exact to Whitworth's standard Gauge.

DRILLS MADE TO FIT ANY SOCKET DESIRED.

EDWARD S. TABER, Treasurer.

New York Steam Engine Co.,

MANUFACTURERS OF

Engine Lathes, Planers, Bolt Cutters, Upright Drills

AND

MACHINISTS' TOOLS

OF ALL DESCRIPTIONS.

OFFICE AND WAREHOUSE, 98 Chambers Street, New York.

WORKS AT PASSAIC, NEW JERSEY, WITHIN 11 MILES OF NEW YORK CITY.

GEORGE PLAGE, President.

C. A. CHEEVER, Treasurer.

Machinery, &c.

**WESTON'S
PATENT DIFFERENTIAL
Pulley Blocks,**

Warranted superior to any made

RATCHET DRILLS,Machine Finished, Case Hardened and
Interchangeable.

HOOKHAM'S PATENT STEEL

Ribbon Sash Line,Working qualities superior, decidedly ornamental
carefully lacquered, and will remain so.**VAN WART & McCOY,**

Sole Agents,

43 Chambers Street, New York.

VOLNEY W. MASON & CO.,

Manufacturers of patent

FRICION PULLEYS,

Friction Clutches for connecting Shafting & Gearing

Hoisting Machinery for Elevators

Mines, Quarries, Pork Packing Houses

Abattoirs, Warehouses, etc.

SHAFTING, HANGERS and GEARING

PROVIDENCE, R. I.

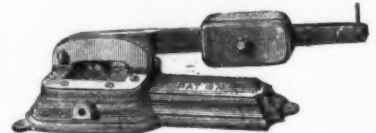
JAMES HENSHALL,

Engineer, Machinist & Blacksmith

1056 Beach St., PHILADELPHIA.

Drawings made to order. Repairing of all kind
promptly attended to. Blacksmithing executed in
all its branches.**IMPROVED GAGE COCKS.**

Simple, Durable and Efficient.

**Automatic Damper Regulator****FOR STEAM BOILERS.**

SAFETY, ECONOMY & DURABILITY

MURRILL & KEIZER, Baltimore.

Agents Wanted. Send for Circulars.

HENRY BLUNDELL & CO.,**MACHINISTS,**

And Manufacturers of

JEWELERS' TOOLS

of every description.

BRASS FOUNDERS & FINISHERS.

Barry's Steam Cylinder Packing

PATENTED JUNE, 1872.

LITTLE'S PATENT CART HOIST.For State Rights, and Rights to manufacture, or further
information, address

Nos. 98 to 106 Orange, & 63 to 69 Peck St

PROVIDENCE, R. I.

Price List sent free on application.

**PUNCHING
PRESSES, CO.,**

MIDDLETOWN, CONN.

**DOORS,
SASHES,
BLINDS,****Wood Mouldings, Stair
Rails, Newels,**

and all kinds of Fancy Glass.

Large Stock. Lowest Rates.

ORDER WORK SOLICITED.

Send for estimate and price lists.

KEOGH & THORNE,

254 & 256 Canal St.,

NEW YORK CITY

MAYER'S BOILER COMPOUND for the Removal and Pre-
vention of Scale and Sediment from Steam Boilers.It is entirely free from acids; for efficiency it is
the cheapest invented. Price, 25 cents a pound.
Parties trying this compound and finding it other
than represented are freed from any cost. All I ask
is a fair trial, and insure satisfaction. I will send to
any party as many pounds as they need for trial, and
ask payment only after they are satisfied. 1-3 of a
pound for each horse power for first trial; after, 1-8
of a pound every two weeks. Send for Circulars.

W. J. JAY, Manufacturer, 99 Mercer St., N. Y.

PERSEVERENCE

STEAM ENGINE WORKS,**Steam Engines and Boilers,**From 7 to 100 horse power, built to order. A supply
of second hand Boilers and Engines always on hand.**J. W. WRIGHT, 113 Spruce Street, Phila.**

